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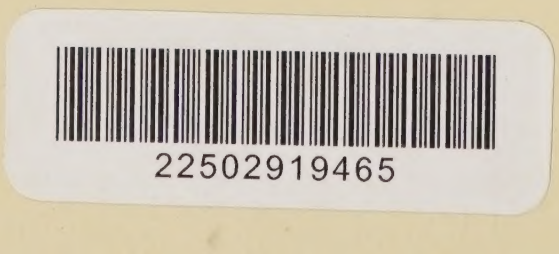

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OBSERVATIONS

RELATING TO

THE SCIENCE AND ART OF MEDICINE.

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THE SCIENCE AND ART

OF

MEDICINE.

BY

WILLIAM WEGG, M.D., CANTAB.,

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TO

HENRY SHUCKBURGH ROOTS, M.D., Cantab.,

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, LONDON;
CONSULTING PHYSICIAN TO ST. THOMAS'S HOSPITAL, &c.

My Dear Sir,

When a writer is about to dedicate the first-fruits of his pen to an honoured instructor of former years, it may be that he ought to ascertain whether the offering will be acceptable or unwelcome. If such be the proper course, then I am in fault for thus connecting your name with a volume of which you have neither read nor heard one syllable.

But though this proceeding seems of doubtful propriety, it may perhaps be excused by its object. After a careful re-

perusal, I thought that some of the following contents might not receive from you the sanction implied in a permitted dedication; and therefore, lest you should be involved in the dilemma of reluctantly withholding your countenance from this work or of yielding it unwilling support, I have merely addressed it to you as a token of respect for your character, of gratitude for your kindness, and of admiration for your talents.

That the public may long have your eminent and valued services, that the profession may long enjoy the advantage of your counsel and high repute, that your private friends may long number you among the most welcome and honoured of their circle—these are the earnest hopes of

Yours ever faithfully,

WILLIAM WEGG.

PREFACE.

THIS small Work comes before the medical world without pretension. It is not a closely reasoned and finished production, but is principally composed of remarks and suggestions which may by many be regarded as often vague and unconnected. Yet it would be difficult to make them otherwise in a performance which is essentially discursive and has for its main purpose the elucidation of a subject confessedly obscure.

To express a conviction of the power of medicines will by most persons be thought unnecessary. But all are not of this mind. Some there are who deny that medicines control disease or remove its conse-

quences, and who invariably attribute recovery to the influence of diet, air, cleanliness, &c., or to the unaided efforts of nature. That these are valuable restoratives of health, all other members of the profession are as ready to declare as the most forward advocates of their exclusive efficiency have a right to expect; but, while they avow concurrence in this opinion, they marvel that men, who perceive and highly estimate the effects of ordinary means, should be blind to the effects of medicinal agents.

If the contents of this book were far more persuasive than they are, they would not convince when bed-side teaching has failed. Therefore, the most to be hoped from those who cannot assent to their justness is, that they will allow the possibility of the notions entertained by others being as well founded as their own.

But by those who believe in the curative properties of medicines this volume will be better received. Being assured of its sincerity, they will not be extreme

to mark its imperfections. They may find in it little that is new, and only a poor expression of much that is old; but they will remember that trusty novelties are of rare attainment, and that stubborn facts are the best guides in times of doubt.

Nevertheless, while stating a general confidence in the efficacy of medicinal agents, it is natural enough that we should inquire into their secret operation. To do this is the chief object of this work. But in thus inquiring, the writer sometimes propounds fallacies palpable to him who reads. That this remark may be applicable to the present attempt, the author somewhat fears; but, though many censure, he will be more than recompensed if a few considerate and enlightened men acknowledge that he has not written altogether in vain.

5 Maddox Street, Bond Street,
January, 1851.

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INTRODUCTION.

PRACTICAL medicine includes both science and art. The science is acquired by instruction, observation, and thought: by its assistance doctrines are formed, generalisations made, and explanations of various phenomena proposed. The art is acquired to a limited extent only by instruction and thought: it is mainly founded on observation, which careful experience has enlarged and chastened. The science is an universal, the art an individual knowledge. The science is added to and improved by successive generations: it forms a stock of information communicable to all and susceptible of increase from the united efforts of mankind. The art, on the contrary, chiefly pertains to individuals; is imparted to and received by a few only, is mostly acquired by self-instruction, and is in great part lost when its possessor dies. He who is versed in the science can theorise and generalise on the chain of causations

which bring about a disease and give rise to its various symptoms, and can direct his treatment on principles of general application. He who is skilled in the art can see at a glance, and almost instinctively seizes, the points in the case, and avails himself of seeming trifles which the mere philosopher might pass unnoticed. The proper use of remedies in a given case, what degree of effect should be produced on the vascular system, and what impulse be given to the nervous; to what extent purgatives and other medicines should be carried, and in what kind they should be employed; cannot be taught by principles. It is by self-teaching alone, amidst the toil and cares of actual practice, that such knowledge is obtained: and many men, who talk and speculate most ably on disease, and by their dazzling brilliancy throw into the shade their less learned brethren, appear but as novices, when placed at the bed-side and called upon to practise their profession. The nicer distinctions of disease are by them unseen, and apparently trivial circumstances, which influence the practical man, are lost to them. They know how to treat a disease, but not a case; are full of other men's opinions, having neither knowledge nor judgment of their own; are always appealing to statistics and endeavouring to reduce disease to a formula, but endeavouring in vain.

No one values more highly than I every aid that furthers the knowledge of medicine: but in these days undue stress is laid upon agencies of a speculative nature, for the efficiency of many of which we are obliged to rely on the authority of others. This remark applies to chemistry and the collateral sciences when they are brought to elucidate many points in medicine. However plausible such solutions may seem, it is our bounden duty to resist the charm of their novelty and simplicity until they are fairly tested by experience. Some gain credit from the celebrity of their propounders; others from their own speciousness: but I confess myself more disposed to hold fast to the system which has raised British physicians to their present high position as practical men, than to fall into the more modern system, which, on the one hand, attempts to accomplish and explain all things done in the living body as if they were effected in a laboratory; or, on the other, tends to induce inactivity of treatment, if not to suggest a doubt of the utility of treatment altogether.

In the following pages the remedial agents noticed are spoken of in an isolated manner. It is not attempted to give all their virtues and uses, and the combinations in which they are found most serviceable; but an endeavour is made to point out the principles on which they act and the principles by which

we should be guided when we employ them. Without these the physician hesitates, doubts, despairs; and often ends in thinking, that it is better to leave nature to herself, than to embarrass her with needless, and perhaps mischievous, interference. Thus he sinks into inaction; congratulating himself that he is just as successful as heretofore: and so, perhaps, he is. But such knowledge as he possesses may be worse than none; such treatment as he indicates may be worse than useless. Men of this sort, if they continue to practise after having lost all confidence in themselves, should place some reliance on the better informed and more earnest members of the profession, and not regard them as dupes of a system—of a system, too, which numbers among its defenders living men of the highest ability and worth, and was founded, and has been sustained and amplified, by some of the greatest sages that the world has seen.

In this volume my object is to look, as it were, into the mechanism of disease; to see where its mainspring lies, how its action is carried on, and how remedies may be made to counteract or direct its agency. Without such investigation, the value of the most efficient remedies will be uncertain and disputed; because, principle being absent, the remedies will often be used improperly and therefore be found to fail.

The all-wise CREATOR has designed that our vital operations should be ministered to by three great systems: the *nervous*, the *vascular*, the *digestive*. Through these systems life is sustained and disease is wrought. Integrity of their function is essential to health; for they carry the supply to the body and the waste, by particular channels, from it, and bring into close connexion parts and organs the most remote from one another. Disorder of the function of these systems induces and ministers to disease; for in them its seeds are sown or formed: and whether these be derived from a noxious agent taken into the alimentary canal, or into the blood through that or some other route, as the lungs; or whether they spring from some subtle agency, physical or moral, acting on the brain or nerves; or whether they arise from some harmful influence originating within the body itself—some marked disorder which perturbs the frame, or some insidious functional or organic perversion—still, these systems are the laboratories in which the elements of disease are formed, and the channels through which morbific agents assail the body: the beacons which warn us of the inroads and progress of disease, the tests which indicate the degree of the vital power, the media through which the physician applies his remedies to the remotest and most intricate parts of our frame.

And here we may remark, that the practitioner should never lose sight of the important consideration that these three systems are not to be regarded separately, but in relation to one another: for a considerable derangement of function, or serious injury of structure, of either causes a sympathetic disturbance in one of, or more commonly in both, the others. Nay, this secondary may be even more severe than the primary affection; not only in its symptoms, but also in the resulting organic change. Nay further, the primary affection may cease entirely and the secondary rage with fatal violence. But while we state, that the functions of neither of these systems can be much deranged without a simultaneous or speedy disorder in the functions of the others; we can conceive, that the functions of either may be so little disturbed, as to produce a sympathetic derangement so slight, as not only to pass unnoticed, but to be difficult of detection, and consequently inadequate to the production of more than trivial effects upon the general frame. However, we must be alive to the grave complications which may result from this close sympathy, both as regards the general disturbance and the appearance of new, unexpected, and perhaps inexplicable, symptoms: and we must also constantly bear in mind, that the most alarming lesions of either of these systems may result in rapid dissolution be-

fore there is time for the manifestation of sympathy by the others.

Before we proceed to notice the modes of operation and the powers of remedies, it may be observed, that there are actions and influences of vast effect, which operate in every individual and give him a peculiarity; and which not only thus render him prone to certain diseases and modify their course, but moreover resist, and even entirely prevent, the beneficial action of remedial agents upon him.

It is generally admitted as probable, that there is no individual without some *hereditary peculiarity*. The child resembles his parent, not merely in countenance and general form, but in outward peculiarities and deformities; and, frequently, in disposition also. To say nothing of every-day observation, abundance of curious and most remarkable cases might be cited in illustration and proof of these facts. What is true of external formation is equally true of the internal organs and their tendencies; and hence, hereditary disease: gout, rheumatism, hæmorrhagic diathesis, tubercular and malignant disease, mania, affection of the heart, &c. Of these, perhaps tubercular disease, or rather that peculiar state of the system which readily gives rise to its production, is most frequently transmitted. But they are all capable of transmission; and the tendency to them may have considerable

influence over any accidental disease that may arise, and over the action of any remedies that may be employed. That this tendency really exists is seen in the marked proneness of some persons to these diseases, while no disposition to them is evinced by others: some being with impunity long subjected to physical and moral causes known to excite these affections, while others, on the slightest exposure to the same causes, are attacked by these diseases in their most alarming form.

But though this tendency may exist from birth, it does not follow that it is transmitted. It may be a peculiarity arising *in utero*, and which has no existence in either of the parents: for we see strong and robust parents with weak and delicate children, and, though more rarely, sickly parents with robust offspring. Many have a tendency to disease in a particular part or organ; the skin, the brain, the chest, or abdomen: and if they be exposed to a cause which upsets or impairs the health, this predisposed part or organ is attacked. In some, whatever the disease may be, there is great nervous excitement or depression; in others, great vascular excitement or inactive congestion. In some, inflammation runs a violent and rapid course to a fatal result or to resolution; in others, it is languid, slow to destroy and slow to terminate in health. In some, the slightest wounds are followed

by erysipelas and danger; in others, such wounds are unattended by any troublesome effects.

In most cases, when an organ is attacked, particularly by acute disease, the system takes alarm: indeed, it is often this alarm which first leads the practitioner to suspect the presence of disease. But in other cases, the most severe and even fatal local affection may pass through all its stages with scarcely any disturbance of the system. These remarks are well illustrated in fevers. In them it sometimes happens that the patient, who had been proceeding favourably, suddenly becomes anxious, has increased heat of skin, increased frequency of pulse, thirst, perhaps more or less delirium: the physician examines all the organs, and in one or another of them finds acute disease. In other cases there is none of this excitement or reaction; but the patient has sudden collapse, weak pulse, cold extremities, &c.; and on careful search some organ is found to be seriously inflamed. We see, then, how oppositely a severe local affection may act upon different individuals apparently under precisely the same conditions.

In close connexion with hereditary tendencies and with peculiarities is that influence which operates with almost endless diversity on the human being, rules over and modifies all the functions of his body, whether in health or in disease, and which by the ancients

was called the *constitution*. And perhaps no better term can be used as a general expression of all those powers and effects which have been mentioned.

This constitution is little heeded by many modern practitioners; but is admitted by the sound physician, though under a variety of names. Indeed, we must admit, that there is a peculiarity in every individual, which has a great influence over the rise and course of disease. For example: a number of persons, in good health and under precisely the same circumstances, are exposed to malaria: one has intermittent; another, neuralgia; another, dysentery; another, remittent fever: or, a number of persons have violence done to some part or organ, as by a blow: in one, acute inflammation follows, ending in deposit of lymph and induration; in another, inflammation also follows, acute or even chronic, but ending in deposit of pus, disorganisation, gangrene; in another, tubercle, cancer, or hydatid, is the result. A number of persons have a blow on the head: one becomes maniacal; another, epileptic; another suffers from delirium tremens; another has encephalitis. A number of persons in a boat are upset, and remain some time in the water: one is seized with a violent cold; a second, with pneumonia, or bronchitis; a third, with enteritis, or peritonitis; a fourth, with phrenitis; a fifth, with rheumatism. Yet, in all these cases the persons may

appear to be alike in health and strength, are under the same moral and physical condition, and may even be of the same family. Therefore, humanly speaking, they are liable to be affected in the same way by the same exciting cause. Yet experience tells us, that we can nowise predict what form the disease will assume. The individual, however, is often able, from knowledge of his constitutional peculiarities, to foretell with tolerable accuracy what will befall him. In other words, every man knows that he is peculiarly liable to certain diseases, and that when disease arises in him it suffers peculiar modifications. A remarkable instance of this is seen in syphilis; and much that is true of the virus of that disease is true of other morbid poisons. Some persons appear to be not susceptible of its influence at all, while others are particularly liable to be affected by it. When the disease has been contracted, the sore, after a more or less prolonged period, gets well, with or without medicine; and although, in such cases the whole system is undoubtedly affected, or, at all events, the poison enters into and circulates through the system, yet it nevertheless happens that there are some persons in whom it seems to be innoxious, and to whom no secondary injury occurs from its introduction: whereas in others the result is far different: for soon after the poison is fairly in the system, its presence is shown by some

one or more of its secondary attacks; and its ravages may, and often do, proceed, notwithstanding the most judicious treatment, to inflict incalculable mischief on the different structures and organs of the body: so that the impartial observer can come to no other conclusion than that some persons are constitutionally prone to the worst consequences from the morbid poison, while others appear to be uninjured by it.

The effect of remedies also often illustrates the principle of constitutional peculiarity. Mercury may be given in precisely the same manner to a number of persons in apparently the same condition, and yet in no two of them may its effects be the same. In one its operation will be slow; in another, quick; in one it will cause a variety of untoward results; in another, go on in its usual course to salivation; in another, produce none of its peculiar effects. As to its ulterior effect: in some, its agency is most beneficial, all its energies, as it were, being directed to the diseased part; in others, it entails distress and misery, by rousing dormant tendencies to disease, undermining the health, and hurrying its victim to the grave. In fact, according to individual peculiarity, this powerful mineral may be a fortunate remedy or a fatal poison. Again, tonics act very differently on different persons. In some, even in very small doses, they produce great excitement, headache, &c.; in others, though given in

very large doses, they do not appear to have any ill effect. Indeed, anomalies of this sort are most curious and instructive, and instances might be multiplied almost to infinity.

Mode of life has great influence not only in predisposing to and producing disease, but also in modifying the effects of the remedies we employ. In its relation to these particulars, there is a great difference between the hardy country labourer and the feeble town mechanic, the temperate man and the drunkard, the well and ill fed, the indolent and active, the rich and the needy, the man whose mental faculties are active and highly cultivated and him who lives in swinish lethargy; between him who in pure air is engaged in healthy occupations and him who lives in the pernicious atmosphere inseparable from certain trades. Indeed, the effects which the mode of life has upon us require only to be alluded to; they are admitted by all. It is merely necessary to recall to the mind of the reader the great influence which the manner of living must have on the production of disease, on its symptoms, on the powers of the constitution, and consequently on the mode, activity, and duration, of our treatment.

And here, as in some measure connected with this subject, it may be asked, must not the state of pregnancy greatly affect the diseases which occur during

its continuance? A woman who has even far advanced tubercular disease of the lungs becomes pregnant; the disease is stayed, and the health even improves. By and by she is delivered; the symptoms burst out anew, and she speedily dies. Is not all this to be explained by supposing, that during utero-gestation the vital powers of the system are exalted, and that the lungs, participating in the generally increased energy, the disease is therefore, for a time, arrested; but that when delivery has occurred, the cause of the increased vital energy being removed, the disease again proceeds? Besides, must not the losses and shock which the woman sustains conduce to the serious depression of the vital powers, and hence the system be again reduced lower in fact than ever, and the disease in consequence make rapid progress to its fatal issue? If so, it would appear that we may much promote recovery from tubercle by raising the power of system, and thus imitating the state which pregnancy induces.

The *influence of the mind* over the body, and the necessity of taking it into consideration in the treatment of disease, have been admitted by physicians in all ages. Indeed, even in the healthy body, its effects are apparent to the most ordinary observer. Great activity of mind wears the body by diminishing the activity of the nutritive process; especially if the

exertion of the mind is prolonged, so as to deprive the individual of the proper quantity of sleep. Its influence over other functions is plainly seen: thought of eating brings the saliva; the presence of the infant excites the flow of milk. The passions—the stronger actions of the mind—produce analogous results: tears, perspiration, watery urine, diarrhœa, jaundice, the sudden alteration of the mother's milk. Cheerfulness and hope not only lighten bodily suffering, but singularly aid recovery, even when structural alteration has occurred. Grief and the depressing passions materially forward the inroads of disease; and even call it into existence, when the subject is predisposed, as in phthisis, disease of the brain, heart, and liver.

In addition to the influences from within and without just named, it would seem that man is affected by particular states of the atmosphere, which give a general type to all disease, though the kind, degree, and duration of effect vary much. These conditions of the air are by old authors included in the term, *epidemic constitution*. This subject is involved in mystery, and what we know about it is limited to some few facts; facts, however, extremely valuable and of great practical importance. It is best illustrated by general diseases, especially by fever, which of all diseases puts on the greatest variety of appearance, and admits of the most varied, and even oppo-

site, treatment. At one time it presents itself with rapid, large, hard and full pulse, and every evidence of great excitement; the essence of the disease appearing to consist in high exaltation of the great phenomena of life: at another, there is small, languid, feeble pulse, with extreme prostration; the tendency being strong to putrefaction: at another, the whole frame appears to receive a violent shock, and there is great and sudden depression of the vital powers, with fierce delirium or muttering stupor. At other times fevers are almost all complicated with inflammatory attack of the brain or its membranes; at others, with inflammation in the chest; at others, with inflammation in the abdomen; at others, with various erysipelatous inflammations; at others, with glandular diseases.

The knowledge of the above-mentioned influence reconciles the different opinions that physicians hold with regard to the nature and morbid anatomy of fever, which disease appears to consist essentially of disordered action of the nervous and circulatory systems. Of course, this disordered action cannot continue long without more or less disturbance of several of, if not all, the functions of the body; and in some cases this disturbance will go on to absolute disease, destructive and fatal in result. But in stating that disordered action of the nervous and circulatory

systems is essential to fever, we do not name the cause of the disease. The cause lies in a disturbing force, of the power of which the disordered action mentioned is but a manifestation, and that disturbing force is a poison. The early symptoms of fever are quite those one would expect to arise from the presence of some poison in the system. The whole expression of the patient, both in feature and gesture, shows trouble, weakness, and lassitude. His movements are feeble and tremulous: he is perhaps incapable of standing, and is restless while lying down. His sensations are vague. His intellectual faculties are obscured and torpid; he cannot fix his attention. He sleeps but little, and is disturbed by dreams. The great functions of his body are disordered: the pulse is quickened, the respiration hurried, the heat increased; the thirst is great, the digestion imperfect, the appetite gone; the bowels are loose or confined; the urine is scanty. It has been said that fever is a disease of the nervous system: yet what can be the nature of the agent which can produce an abiding effect upon that system? That it may receive an impression which can throw it into disordered or diseased action, and through its many sympathies and relations produce subsequent derangement of the whole body, is perfectly intelligible; but that it should receive an impression having, as it were, a period of

incubation, and that the consequent disease should run a course more or less determinate, seem to be entirely inconsistent with the office and function of the nervous system. That system cannot retain any agent from without. It can merely receive impressions from such agent and convey them to within. The part in which an external agent can be retained is the vascular system.

I will not enter into the question of the contagious nature of fever, because it has been abundantly proved that fever may be propagated by contagion.

Although the great characteristics of fever are constant, yet atmospheric or epidemic agency is frequently giving rise to modifications, which have much effect upon the course and consequences of the disease. These modifications are almost endless; every few years bringing some slight or important change, which should have a corresponding influence over our treatment. The mortality in fever varies remarkably in different visitations. This we are unable to refer to any known cause. The form of the disease that occurred in London some years ago, and was commonly accompanied by ulceration of the bowels, was scarcely so fatal as the variety which has been prevalent among us for the last few years, and which appears to be almost without morbid anatomy: for after it we seldom find ulceration of the bowels, or

alteration of any part, except such as may be fairly supposed to have occurred during the agony, or to be of *post-mortem* origin. With regard to London alone, we are bound to believe that there has been great variety of fever prevalent during the last half-century. We cannot suppose that such men as Clutterbuck, Armstrong, and others as eminent, could place the seat of fever in the head, chest, or abdomen, unless they continually found those parts diseased in the cases they witnessed. Nor can we suppose otherwise than that their testimony in favour of blood-letting was correct. It would not be reasonable to think they were in error as to fact. Although we now find that such treatment would be fatal, yet we must allow that then it could be carried out with impunity, even if it were not absolutely necessary and beneficial: that whatever might be the ultimate effect of the treatment, the immediate appeared to be good.

In all ages, and also in our own times, the attempt has been made to lay down absolute principles both as to the nature and treatment of certain diseases, especially of fever. Yet the principles admitted in one age have been refuted in the next. Such discrepancies could hardly have arisen from error in observation. The reputation of the observers and the circumstantial way in which they relate what they saw discountenance such a supposition. The more

probable explanation is, that the complications they speak of, the peculiar features of the disease, and the result of their treatment, were exactly as they describe them: that, in short, disease presented remarkable modifications at different periods, and required appropriate remedies. And hence it is that in old authors we find described diseases, and particular variations of diseases, which to us seem new: that, on the one hand, we are surprised by the vigour of the physician, and, on the other, are amazed at his inertness.

Fever has been rather prominently noticed here, because the changes it undergoes from the epidemic constitution are types which show how that power may modify disease in general, and because fever is, of all diseases, the most susceptible of its influence. This obscure agent which impresses all diseases acts especially upon the acute, and not only affects their duration and severity, but also brings into prominence a peculiar train of symptoms, which, in point of fact, constitutes the epidemic character, and is common to all the diseases of the period.

In relation to remedies, this agent has a remarkable effect; inasmuch as it renders the most opposite necessary in the same disease on different occasions.

Although well aware that there is a fashion in physic, one cannot help thinking that much of what is attributed to fashion is, in truth, the result of sound

observation; that the very contrary modes of treatment which obtain at particular periods are to be referred to the changeableness of character of the disease, rather than to the fickleness or caprice of the profession. If we again refer to the old physicians, and note at one time their extreme activity of practice in certain cases, and its happy effects; and at another time their excessive feebleness of treatment in the same diseases, with equally fortunate results; and further find that both procedures are at variance with our management of what are still called the same affections; we may for a moment wonder at the contradictions involved in the course of action of our predecessors: but when we consider that the actors in these apparently contradictory proceedings were men devoted to observation, of large experience, of deep reflection, and of high repute; when we see what great influence the epidemic constitution in our own day exercises over all disease; we can have little difficulty in reconciling the supposed inconsistencies as to the mode of treating the same disease at different periods of past time, and in attributing such inconsistencies to the peculiar character of the affections, induced by the epidemic constitution then existent. Every one, in his own experience, must have met with cases in point. Ever since the appearance of the cholera and the influenza, eighteen years ago, who has

not remarked how badly, generally speaking, blood-letting has been borne, and that it has, in consequence, been much less used than formerly? From the time when those fatal diseases first prevailed, catarrhs, and indeed all diseases, have taken a low type. Scarlatina has assumed a particular form. The eruption has been very pale and hardly to be seen; but the throat has been very severely affected, causing the death of not a few. Often the disease has appeared to be only slight, when dropsy has followed in an unusually large proportion of the cases.

The practitioner who would treat disease philosophically and well should have the foregoing and like facts and reflections fully in mind. From them is derived much of the knowledge which renders the physician able and successful. Yet there are many in the profession who think lightly of such acquirements and considerations. To them nothing is valuable which cannot be explained in accordance with the received doctrines, or supposed pathological and physiological facts, of the day. If a line of treatment is pursued which will not admit of explanation upon what are called rational principles, but which is nevertheless followed by uniform success; if remedies are used, powerful in their nature, but the actions of which are not fully, perhaps not at all, understood, though long experience has found their employment to

be almost always attended by a good result; such practice they call empiricism. And so, in a certain sense, it is. But the use of all our remedies is empirical: for who can satisfactorily explain the immediate action of any one of them on the living frame? What explanation of the action of mercury do we offer when we say, that it makes the mouth sore, affects the glands, regulates the inflammatory process, and removes the morbid product? These are but acknowledged facts, which the empirical use of the remedy has shown, and observation has noticed. The use of some medicines has taught us, that they will purge, and purge in different ways; that antimony, ipecacuanha, quinine, and a variety of other remedies, have such and such effects, evident to our senses; and beyond this, genius and industry have never penetrated, and probably never will. That part of physiological research which inquires into the laws that govern the actions of organs—laws based on the same principles as those which regulate physics generally—may and will be successfully pursued: but that part which relates to the higher operations—the operations that properly constitute life—will, in all probability, be for ever involved in mystery. We must be content to know the results of these operations, not their causations; to watch the machinery and be ignorant of the motive power.

The duty of the physician—the beginning and end of all his labours—is to prolong life. Of course he will use his best endeavours to prevent those structural changes which ultimately kill, or make life miserable; but the sum and substance of his efforts is to keep his patient from dying. But his remedies all operate, as it were, upon the hidden springs of action, which baffled physiology has never yet unveiled. Is he to wait until physiologists have agreed as to how the great functions of life are carried on; and until he receives instructions from them as to what remedies he should employ, and as to how he should employ them? Is it not wiser to follow observation and experience, which daily confirm, correct, and enlarge the knowledge handed down to us by the greatest physicians that have lived since medicine could be called a science, than to follow those who refuse to employ any remedy of admitted power because they do not comprehend its action, and prefer to stand by with folded arms patiently awaiting the issue of the conflict; or who, if they do use remedies, choose those of the mildest kind, their mode of action, however, being also unknown; or who rely on bringing into increased activity the functions of the bowels, skin, &c., of the relation of which to the disease, however, they confess that they know nothing? Would not these men be more consistent if they refrained

from any interference, since what they do, when they act at all, is precisely after the practice they object to: namely, the use of medicines the actions of which are not fully understood, and the rousing of functions to increased energy, the reference of which to the disease is beyond our comprehension?

The physician must always bear in mind that he has not to deal with a mere machine, in which the operations obey fixed laws and, certain impulses being given or certain actions being called forth, determinate results must inevitably ensue; but that he is treating a living being, who is so constructed that certain operations are proceeding and certain effects are resulting, which in a great measure conform, indeed, to the physical and chemical laws that control ordinary matter, but which are also variously modified,—now increased, now suspended, now perverted—by that peculiar principle so mysterious in its nature and effects, the principle of life.

To return from this long digression: It has already been said that the great operations of life are ministered to by the vascular, nervous, and digestive systems. But although these systems have so close a connexion with life, their functions do not constitute its essence: for, even in fully organised beings, life does not consist in the reciprocal and harmonious actions of parts and organs, inasmuch as

it existed in the highest degree in the germ, before parts and organs were formed, and may continue little diminished in vigour after some of them have been seriously impaired. These actions, in fact, are necessary to the maintenance of life, but are not necessary to its existence: for what effect can a relaxed or constricted state of vessels have upon life beyond that which is consequent upon an altered condition of the circulation and a varied quantity of the blood conveyed? In what way can the nervous system minister to life, except by receiving the mysterious influence which probably originates in the centres, and conducting it to the remotest and most intricate parts and organs, in order that it may regulate their action; in what way, except by forming the means of communication with external agents, the channel through which impressions, however severe or however slight, are exchanged between parts and organs however distant, and the bond by which the various and separate portions of the body are united into a sympathising whole?

But for what purpose, then, is the elaborate vascular system constructed, and the constant supply of new material carried to the remotest parts of the frame? For what is the subtile influence of the nervous system provided, and distributed to every part? Why is it that these distinct systems are

brought into close proximity in the minute structures? It may be answered, that all this is arranged and effected for the purposes of nutrition and its allied functions. Yet neither the most intimate proximity of blood-vessels and nerves, nor the action of blood and nervous matter upon each other, can accomplish nutrition or explain its phenomena. Indeed, it may be demonstrated, that neither the nervous nor the vascular system is necessary to nutrition, growth, and other vital processes. In the germ, these systems do not exist; and, yet, all the changes that constitute growth are rapidly effected: in a word, all the processes of life are then carried on in the most energetic manner; the essential condition, however, being an abundant supply of material on which to act: a condition which in complicated organisations is evidently fulfilled by the vascular system.

Looking, then, at the mode of distribution of the nervous and vascular systems, at the nature of their functions, and at their incapacity of themselves to produce the results that we see produced in the vital operations; we may infer that these systems are destined to administer to some independent power, external to them: looking also at the mode in which life commenced in the germ, and at the extent of the formative power then existing: looking at the requirements of the germ, and at the nature of the

organs and systems it calls into existence to minister to them: we may naturally conclude that the materials of the germ, when multiplied and composing the basis of the more advanced being, maintain their formative power and use these organs and systems as their agents: that, in short, these organs and systems are designed to subserve some purpose external to and beyond their particular function.

A digestive apparatus is constructed, to receive and elaborate material. A vascular system is formed, to carry this material to the remotest parts. A mechanism is provided, to supply this material with air. The admission of air causes the generation of heat, and this heat is diffused wherever the blood flows. But it is essential that this material—the blood—should be kept suitable for its office. Now, as the vascular system is the only channel by which nutriment reaches the arena in which the vital operations are enacted, and as it is also the only route by which effete matters can be removed from the spot in which they are formed, the blood becomes loaded with impurities that render it unfit for the purposes of life. For the removal of these impurities certain organs are provided, by which some of these matters are cast out of the system unchanged, while others undergo change and perform some office before they are expelled. But, to complete the scheme, it is neces-

sary that the several parts of the body should be united by sympathy; that the excess of one part should be carried to another which languishes, and that the extraordinary requirements of a particular point should be supplied. The mass of independent atoms must be brought into relation throughout the frame. This is accomplished by the nervous system. Moreover, setting aside the psychical influence probably seated in this system, we may well suppose that a stimulus is derived from the nervous force itself; by which tone is given to the body, in addition to the stimulus which this system conveys as the instrument of the agents from without; which are of themselves sufficient to stimulate simple organisations, but which in complicated organisations are not sufficient, unless their impressions are carried, at least in part, by an appropriate medium—the nervous system.

From the foregoing it appears, that the great objects in our complicated organisation are the providing an ample supply of proper blood and the means by which it may be carried to the remotest parts, in which, at first in the embryo, and afterwards in the fully formed being, the active force, the really and essentially vital power, is seated. In them lies the force that fashioned and maintains the elaborate organisation, and in them it is that the nervous

and vascular systems minister to that force. These remote parts of our structure have always been esteemed as highly important, though they have been only vaguely described as "the Tissues." Modern research has confirmed what our forefathers conjectured; and has shown, that these tissues are composed of minute corpuscles, simple in structure, but potent in function, having, so to speak, an independent existence, but by their combined action effecting the processes of life; that the same kind of bodies exist throughout animated nature, though they are somewhat modified even in the different parts of the same individual; and that they are in structure and function identical with those which exist in the germ. By these bodies all the vital operations are executed; upon them depend secretion and absorption, renewal and decay. Such are the constituent parts of the substance which in these pages will be called THE FORMATIVE TISSUE; the exciting and operative principle of which will be called THE ORGANIC ENERGY.

Of this tissue the fully formed being is as essentially constituted as was the germ from which that being sprung. The germ is simply composed of this tissue. As developement proceeds, the several parts of the future being are formed by the self-propagation of the corpuscles or cells that compose this tissue.

The different structures of the body, therefore, are formed from this tissue, modified as circumstances require, but always retaining the essentially vital properties—resistance to decay and self-propagation. But, although these properties are essential to life, yet they by no means include all the vital characteristics. Each part and system as it is being formed is endowed with, and when formed retains, a peculiar property, over and above those which are common to living matter: as is seen in the irritability of muscle, the tonicity of vessel, the peculiar function of nerve. The particular functions of the various secreting organs afford a further illustration: for although the same material from which all secretions are formed —the blood—flows to every organ, different products result: in one case, tears; in another, bile; in another, gastric juice. If organs were not peculiarly endowed, why should not the lachrymal gland secrete bile, and the liver tears?

Thus we must consider the body as a living mass, the atoms of which, as in the germ, have, so to speak, an independent life; the degree of their vitality, however, and the mode in which that vitality is displayed, varying much in different parts. Sometimes they simply retain their formative power, and replace the ordinary waste of the body. Sometimes, modified in form, they constitute structures especially endowed:

as blood-vessel, nerve, muscle. Sometimes they constitute products still special, but less permanent than the structures just named: such are the corpuscles in the blood and in the secretions generally.

Such, then, is a brief account of the formative tissue and its function, and of the vascular and nervous systems, by which that tissue is sustained, its influence conveyed, and the several parts of the body are connected.

Upon the degree in which these systems and the formative tissue harmonise in function, health or disease depends. A derangement of the operations of these systems must produce important effects upon the condition of the formative tissue; and therefore their proper regulation is not only essential to health, but, eventually, to life itself.

If these operations bear a due relation to one another; if the formative tissue is sufficiently high in organic energy to consume the material it receives, or to resist the impressions that must be constantly given to it, by reason of the ever-varying condition of the body causing a little increase in, or slightly unfit kind of, the material carried to it through the circulation; if it is able to withstand the constant and yet ever-changing impressions that it must receive from and through the nervous system, the operations of which are so general, sudden, and in-

cessant that the organic energy is continually liable to be assailed, perverted, or otherwise impaired; if the vascular system brings blood of proper quality, and in proper quantity and force; if the nervous system has its proper tone, if it originates a due mobility and force, and carries no powerful or unusual impression to within: if all these conditions concur, the body remains in health.

But if the formative tissue takes up and pursues some disordered action; if its organic energy becomes exalted and the tissue elaborates more quickly and highly than it ought, and the circulation of the part becomes accelerated and more blood than is proper is drawn towards it, which circumstance, unless some counteracting influence arises, perpetuates the disordered action until various injuries, local and general, result: or if the organic energy of the tissue languishes and that structure is incapable of elaborating the materials brought to it, up to the point at which they receive life and go through the metamorphoses which are wrought in nutrition, absorption, reparation, or decay; if the tissue takes on a perverted action, so that the material brought to it is neither too abundantly and highly nor too sparingly and feebly elaborated, but matter of a heterogeneous or decidedly pernicious quality is formed, producing local and general evil: if the vascular system becomes

loaded with substances foreign to it, or the constituents of the blood become altered in quality or in due proportion to one another, or if the current is increased in velocity or strength, so that more blood is brought to the formative tissue than should be in a given time, or that, though healthy and in proper quantity, it impinges on the tissue with too much force: if the nervous system is more moveable than it should be, if it brings powerful, or long continued and disordered, impressions from without or from within the body, if it is deficient in power or faulty in action: if any, or all of these conditions exist, more or less disease is the result.

The degree in which any of the above-mentioned actions or functions may be disturbed is without limit: it may vary from the slightest derangement to the most decided disease. Indeed, the body is perhaps seldom free from some derangement of the nervous or vascular system: but the disturbance being slight, the organic energy of the formative tissue is, probably, able to resist it. In fact, upon the energy of this tissue it is that the state of health mainly depends; and the amount of this energy originally conferred upon the individual it is that renders him robust or feeble, of vigorous or delicate constitution.

The impression which originates diseased action having been received by the formative tissue, various

changes are caused; their variety depending on the function of the part affected. If the impression falls on a glandular structure, increase of function commonly ensues, and there is inordinate secretion, healthy or morbid; the corpuscles on the secreting surface being formed more rapidly and abundantly than before: the function of the corpuscles which compose the interstitial substances being often at the same time increased—the corpuscles themselves, probably, increasing in number also,—so that hypertrophy is produced. If the impression falls upon a simple secretory surface—such as a serous membrane,—augmented secretion for the most part follows; but with little interstitial deposit. When, however, the impression falls upon a non-secretory part, interstitial deposit alone ensues, and is evinced in the various changes which take place in the substance of the part: as enlargement, induration, and the rest.

The organic energy being once disturbed or perverted, its disordered action may proceed to any extent or persist for any time; the degree and duration of the disturbance being generally in proportion to the continuance of the impression and to the amount of its force. If a constant supply of deleterious matter is carried to a part, the probability is that more or less of permanent disease will result. But an impression of even short continuance may

cause an action in the part that may proceed slowly and uninterruptedly till complete structural change is produced. In fact, no certain prediction can be formed from the nature and duration of the impression. The effect will depend on the peculiarities of the individual.

Now, if from exposure to cold, or other cause, an impression is carried to a part or organ which is in such a condition that any disturbing force may induce disordered action in it, alteration in its organic energy ensues, which may be slight and evanescent or grave and prolonged. The organic energy of the part being thus altered, various results may follow, the most common of which is inflammation. But when the organic energy is perverted, who shall say what changes may not follow! The foregoing is the manner in which an impression acts through the nervous system. But the organic energy of a part may be disturbed or perverted through the vascular system. From some cause or other the blood may undergo change or pollution, and the part be no longer supplied with material necessary to its healthy operation. If this change or pollution is great and rapid, vital action ceases everywhere, and death is the quick result. If the change or pollution is of less intensity, disturbed action throughout the system follows, as in fever of various kinds: if of still less intensity, dis-

ordered general health occurs ; or local affections may arise, on the same principle as in our first illustration of the effects of impressions made through the nervous system, namely, that a cause which pervades the whole system through the blood may, from some peculiarity in a part, produce a local disease.

It may be further remarked, that the vascular and nervous systems do by a sort of independent action influence both health and disease. Their proper or disordered function must affect the system at large. But though they are thus capable of exciting and administering to diseased operations, yet they cannot do more. They cannot by themselves produce morbid changes. The formative tissue must still be concerned. If that resists the attacks made upon it (which, if they are long continued, is perhaps impossible), great excitement of the system may occur, but there will be no structural change. Allowing that disordered action arises in the vessels, what can result beyond increased rate of circulation, vascular dilatation, alteration of the quality of the blood, with more or less stagnation of that fluid, and some effusion of part of its constituents into the interstitial substance ? Granting that any or all of these alterations take place, where is the proof that they can bring about anything more than mechanical effect, unless we admit that the blood is able of its own proper

power to produce all those changes which we call inflammation, hypertrophy, and even nutrition itself? To take the disordered action of the vessels and its consequences as the really efficient cause of inflammation, and of the other processes mentioned, would be as unreasonable as to attribute the increased verdure following upon irrigation of an arid soil to the husbandman who directed the stream, or to the water that flowed. In both cases the effects are far beyond the apparent agents, which are but excitants that rouse to activity the vital principle lying dormant in the soil or in the part.

Such, then, is a slight sketch of the manner in which disease takes its rise. We have seen how importantly the vascular and nervous systems act; that although, as has been said, they are only subservient to life, they still play so great a part in its maintenance, so influence it by their own state, and so demonstrate its condition by their own tranquillity or disorder, as to become of the highest interest to the practitioner, both in relation to the evidence they afford as to the condition of the system and to the means they offer of influencing the vital operations, which can only be reached through them.

We may say, therefore, that in a practical point of view the life of the individual is carried on by the agency of these systems.

To study the influence which disease has over them, how far they indicate its inroad upon the vital power, what mode of relief to the suffering body is suggested by their condition, how they may support it when sinking or calm it when excited, how the effect of certain medicines may through them reach the disturbed part, how a remedy may by their agency be sent to a depurating organ, in order that it may be made to cast some noxious matter from the body—to study these and other relations of these systems to the course and treatment of disease is, indeed, to pursue an investigation of the highest interest and importance.

REMEDIES IN GENERAL.

To say that medicinal substances are received into the alimentary canal, find their way into the sanguiferous system, and are thus carried whithersoever the blood flows, is to speak of what is so trite as to seem scarcely worthy of notice. Yet, in truth, upon the due appreciation of these circumstances, and upon their subserviency to our purposes, the proper treatment of disease greatly depends. But to fully estimate the value of these circumstances, we

must carefully bear in mind that the mechanism into which remedies enter is endowed with, and in all its operations is controlled by, the vital principle—in these observations called, the organic energy. By their influence over the material part in which this energy is seated it is that remedies modify the energy itself, and thus eventually produce their own particular effects. It would be unnecessary to insist on the effective operation of this energy were it not that in these times there is a disposition to greatly undervalue, if not to deny, its agency.

Without going into details, it may be said, that if we look into our organisation we shall see that the molecular parts of our bodies—in whatever compounds they exist, whether ternary or quaternary—would, from the peculiar circumstances in which they are placed as to warmth and moisture, have a constant tendency to be decomposed and to react upon one another, were it not for a governing principle inherent in living matter—the organic energy. This, so long as it is in full operation, prevents decomposition. Its power of staying the ordinary operations of chemical affinity is seen when large collections of fluid, as serum or pus, remain unaltered for a considerable time in the pleura, peritoneum, &c.: it is also seen in the usual operations of the economy, as in the case of the contents of the alimentary canal and of

the bronchial ramifications. In these instances the efficacy of the organic energy is so great, that the mere contact of these contents with the vital solids is sufficient to keep them from obeying the chemical laws. It is true that the contents of the serous sacs are kept from contact with air, and that when such contact happens, decomposition to a greater or less extent occurs: yet the healthy bronchial secretion, uncorrupted though exposed to air; the innocuous presence of air in a serous sac containing fluid, as in pneumato-thorax; and in the case of the alimentary canal, the preservation of substances prone to putrefaction; all prove the power of the organic energy to prevent chemical changes, even under circumstances favourable to their occurrence. The decomposition which takes place within the body very soon after death in parts too remote to be reached by air proves further and satisfactorily that the absence of this energy favours changes which its presence would not permit.

The organic energy, which directs and accomplishes all the operations that characterise the living being, pervades the entire system; but the proportion in which it is distributed to the several parts, and the mode in which these manifest their particular endowment, vary much: as seen in muscle, vessel, nerve, gland.

If the organic energy is only locally disturbed, the nutrition, or some function, of a particular part may be alone disordered: but if the organic energy is generally disturbed, all the functions of the body may be thrown into disorder: as in fever. Yet, it may happen—indeed frequently does—that although the organic energy is disturbed generally, the apparent disorder consequent is limited to a particular part: as seen in the well-known tendency of the morbid matter of gout to attack the foot; or when the materies morbi of rheumatism as its first effect induces pericarditis, which I have seen appear some days before the occurrence of the rheumatic affection of the limbs. The reason why morbid matter, which may be supposed to affect the organic energy in general, fastens upon that of a particular part is at present inexplicable (except as regards excretion), and probably will ever remain so. Now, such being the frequent course of operation of materies morbi, it is not surprising that other agents, which also act upon the organic energy, should often show a like uncertainty as to the part which they affect, though, as with morbid matter, their operation is in general determinate: and reasoning on this analogy, we might expect that medicinal agents, introduced into the body and acting upon its organic energy, would, at the same time that they produce a general effect

upon the system, often peculiarly influence some particular part. And so they do: as the effects of opium on the nervous system, of antimony on the vascular system, and of mercury on the formative tissue, show. In short, remedies have not only an effect upon the organic energy in its relation to the body at large, but also in its relation to particular parts; and this local effect of remedies it is that marks their peculiar action.

In employing remedies, we must always bear in mind not only their particular local effect, but also the influence they may have over the function of the nervous and vascular system: for as these systems have a very important part in the maintenance of life, they must also have an important part in the production and sustenance of disease; and as remedies must act upon the organic energy of these systems, it is of great consequence to know how they act, and how so acting, they modify the operations of disease.

The nervous and vascular systems, therefore, are of the first importance to the physician. They are conductors of impressions from his remedies, or of his remedies themselves. To a considerable extent he has power, and often direct power, over their functions; and thus, through their instrumentality,

he may directly or indirectly affect the organic energy seated in the all-pervading formative tissue.

The remarks upon the digestive system—so far as they concern the alimentary canal—I shall defer until the observations relating to the vascular and nervous systems, and to some remedies which act through them, are concluded.

The vascular system is the channel through which the supply is brought to, and the waste carried from, the formative tissue. Through it also most medicinal substances are conveyed, and, like the food, are brought into immediate contact with the very seat of the great functions of life: for it would appear that remedies almost invariably operate by influencing the formative tissue.

Yet, while it is supposed that remedies operate by affecting the organic energy of the formative tissue, it is not denied that chemical actions occur within the body. Nothing is clearer than that such actions do take place. Indeed, the ALMIGHTY accomplishes his designs throughout the universe, whether they be great or small, in accordance with a few simple laws; and doubtless the phenomena of life are in some way connected with them. But it seems no less sure that, although the products of vital action have certain

chemical properties and composition, they are still only products: and as, according to the ordinary laws of nature, matter, whether living or dead, must have some definite composition, so does it follow that the laws of chemistry influence that composition, and thus far play an important part in the economy of the living being. Yet even these chemical effects are controlled by, and perfected through, the organic energy. Life is peculiar and undefinable, obeying no known laws, but availing itself of and directing the ordinary forces which control the changes and operations constantly going on throughout the world. But life is beyond these forces, and of far greater power and mystery. Apart from its influence they obey, as it were, a blind impulse, and form unions which experience enables us to predict as inevitable: it, on the contrary, interrupts their agency, and causes unions inconsistent with the rules of inanimate nature; forming combinations and suspending affinities to an extent that we, perhaps, shall never fully comprehend. These remarks are in some degree illustrated by the blood, which, in common with the solids, is endowed with life; so that substances circulate in it in such forms as appear to be at variance with the known chemical affinities existing in compound fluids. But though affinities of this sort are generally suspended, yet some, which

particular purposes make necessary, are constant in operation.

Although medicines which are carried through the circulation chiefly act upon the formative tissue, including the blood, we must, nevertheless admit that they affect the vascular system—the vessels themselves; like as we conclude that medicines which act upon the formative tissue through the nervous system must act upon the nerves themselves. The action of medicines upon the vessels must be considered to be of a vital nature. For the most part it can merely increase or lessen their tonic power: and in such case, diminished tonicity, as from antimony, and increased tonicity, as from quinine, must have considerable effects on the economy. In estimating these effects, however, it is not necessary to consider them as fresh elements; but merely as a part of the general effects that remedies have upon the formative tissue at large, and consequently upon that tissue as it exists in the vascular system. Nor have these effects upon the vascular system any efficacy *per se*: as curative means they can be efficient only by influencing the formative tissue which they supply, and in which lies the power that ultimately works the changes of both disease and health. Nevertheless, these effects are important points in practice; for though in the treatment of dis-

ease it is necessary that excessive tonicity of vessels should be reduced, it is equally necessary that failing tonicity should be supported: for whatever ill results the former may have in keeping up the local disease and exciting the system, the latter has quite as evil by removing or lessening the pressure and supply necessary to proper action, and also by materially lowering the vitality of the whole frame, and thus greatly inducing the sinking state.

The classification of remedies usually adopted by writers on therapeutics neither assists the practitioner in the selection of the remedy for the particular case, nor explains its operation on the system: for on looking into the catalogues of expectorants, diuretics, diaphoretics, &c., it will often be found that the same remedy, as antimony, squill, may with propriety be placed in most of them. So that, although we admit that the remedy has such an effect as warrants the term applied to it, yet still, as such an effect is in no case certain, we cannot say that such is its specific characteristic.

Again, if a remedy has an operation upon several of the parts and functions of the body, that operation must depend on some common cause: for what explanation is it to say that a remedy acts as a diuretic if the skin is kept cool, and as a diaphoretic if it is kept warm; such, however, being the fact that ex-

perience teaches? And though relief is frequently coincident with or immediately follows such action, yet they cannot by any means be said to be cause and effect: for while a moist and soft state of skin is an attribute of health, and much to be desired in many diseases, its occurrence may more properly be regarded as a sign that the disease is giving way, than as an evidence of good result from a restored or augmented secretion. That some medicines have a predilection, as it were, for particular organs is undoubted. Yet this predilection is exceptional, since medicines for the most part act upon the system in general, and if a particular organ or part is affected more than the rest, the circumstance arises from some peculiarity in the person, or from some other cause which is accidental.

The proper office of every medicine is to influence in some manner the vital operations. Now, it has already been said that these operations are accomplished by the formative tissue which pervades the body, and that, consequently, the various acts of life which are going on in different parts are all much of the same kind in principle. The inference then is that most medicines affect these acts wherever they are performed. But, as before mentioned, in addition to their general effect through the formative tissue, medicines act specially through the nervous and vascular systems, by which they or their impressions are

conveyed. Now, although medicines for the most part have such a general operation, yet there can be no doubt that some of them operate with peculiar intensity upon certain organs: as antimony upon the stomach, for example. Still, while having this particular effect, they also act elsewhere, though not in so marked a manner: and, indeed, in using remedies we should perhaps look more to their general than to their local operation; for though they may have some special effect upon particular parts and organs, and hence cause pernicious matters to be cast out from the body by diuresis, diaphoresis, &c.; yet it is probable that they not unfrequently produce these results by adding to, or increasing in, the blood some substance which stimulates the part or organ, and which is derived from the agency that the medicine employed exerts upon the general formative tissue. There can be no objection to the terms, diuretic, diaphoretic, &c., used in this limited sense, or to our attempts to produce the effects from which these terms have arisen, if such effects are looked upon as consequences, and not as the chief objects of our endeavours.

It must be admitted, however, that there are substances which, having been taken into the stomach and having found their way into the blood, are thrown out of the system by the kidneys, lungs, &c., and in their passage through these organs irritate them, and

occasionally increase their secretion. Nevertheless, the actions of these substances are so uncertain, that, if our efforts are mainly directed to obtain them, we shall frequently be disappointed. For example, squill often irritates the stomach and bowels; but it may expend its irritating properties upon either the lungs or kidneys, or upon both, or, for aught we know, upon every other secreting organ. Therefore, it is hardly correct to speak of such substances specially as expectorants or diuretics, since any medicine that is known to excite the secretions generally may with equal justness be called expectorant or diuretic; for inasmuch as it affects all the secretions, it must have those qualities, the one or the other, however, being rendered prominent by some accidental circumstance, known or unknown to us. Indeed, so many substances and means, opposite in their nature, unexpectedly produce local results, while others of acknowledged virtue in that respect often fail, that, in cases in which such effects are required, it would seem that we must look for other qualities in our remedies than their power of affecting particular parts or organs.

Therefore I shall speak of remedies as influencing the formative tissue, and observe that their marked effect upon it in particular organs is a part of their operation upon the economy at large; though at times this effect is so strongly evidenced in the great local

trouble, as to lead us to suppose that some predilection of their own, or some accidental circumstance which affects the parts, causes the remedies to exercise unusual energy upon the formative tissue of which the organs are essentially composed. However, it is not my wish to condemn the practice of exciting the action of particular organs, as I am fully aware of the great importance of such action to health and of its greatly depurating effect in disease; inasmuch as these organs—kidneys, &c.—afford the chief outlets for the materies morbi circulating in the blood. Except when especially required, the simple increase of discharge, however, is the smallest advantage gained, though by it alone the efficacy of the treatment is commonly estimated. The mere fluid discharge depends upon many trifling circumstances over which the remedies employed have but little direct control; and in my opinion the important effect of our agents is the increased production of matter-less fluid: as when colchicum increases the urea, bile, and excretion from the glands of the alimentary canal. These are the results of vital operations, and, though less evident, are far more important than mere fluid discharge.

The exact manner in which remedies act upon the organic energy of the formative tissue is, and probably will long remain, quite obscure: yet it may perhaps

be faintly elucidated by the operation of other agents upon that tissue. The poison of small-pox or scarlet-fever enters into and infects the system; the disease runs a course, and all seems over. Yet a certain change has happened: for, as a general rule, the renewed application of the poison is for a time incapable of again inducing the disease, although no alteration is apparent in the person's state. That there is, however, some alteration in the vital properties must be admitted, because the individual is not only for a season protected, but because in most cases time brings about the liability to re-infection; the resisting property imparted being lost by the successive changes that the formative tissue undergoes. But of other poisons—as syphilis—the evil effect upon the system is frequently abiding. The disease does not run a certain course and, having done so, seem to be gone; but often breaks out again and again, and for the rest of his life modifies all the ailments of the patient; without, however, protecting him from re-infection. Again, any part which has been once attacked is in many persons for ever after prone to diseased action.

Now it is hard to suppose that the course of events in these several cases, and in a multitude of others, depends on a material change: for if it does, the changes of form which matter may take must be almost endless. Neither does such a supposition, if

allowed, entirely remove the difficulty: for it assumes that the peculiarities of the individual, original or acquired, depend on some peculiarity of the material part of him; and this is not probable. It is difficult, therefore, to subscribe to any other opinion than that our material parts are, over and above their properties as organic matter, endowed with a property peculiar to them—the vital principle or organic energy; through which they are capable of producing extraordinary, and except through this property, incomprehensible changes, and of setting all natural forces and phenomena at naught. And as light, heat, and electricity, require materials upon and through which to act and show to us their existence, power, and properties; so does the vital principle require a material for its display: and as light, &c., have their field of action in the universe at large and in matter generally; so has the vital principle its field of action in the vegetable and animal kingdoms: and as light, &c., affect all matter, and our bodies are made up of matter; so are they liable to be affected by them also: for although in most cases and circumstances the vital principle resists and uses these agents for its own purposes, yet there are occasions when, either from their intensity or other causes, these agents overcome that principle and act on our bodies as they do on ordinary matter: and as mechanical force and such like agents

in acting upon inorganic matter are capable of causing the manifestation of the imponderables within it, giving rise to various effects; so does the action of certain substances upon our material part cause the manifestation of the vital principle seated therein: and as in acting upon inorganic matter we influence the imponderable through the matter, so do we by acting upon organic matter take perhaps the only way in which we can reach the vital principle.

However, it does not necessarily follow that for the manifestation of this principle there should be any actual change in the matter in which it resides. Indeed, such change is rather the consequence of the manifestation than its cause. Nor is this an over-refinement; for if the impression—say from the nervous system—is capable of influencing a part of the formative tissue so as to modify its action, it does not follow that organic change in the tissue must result or destruction come to the cell: for if the agent is capable of setting up action before structural change, or rather without it, there is no necessity for such a consequence; though, from the nature of the function of the part, such a consequence occurs in the majority of cases. My position is, not that change does not most frequently happen, but that it is not absolutely necessary that it should occur: that it is not the first step towards the manifestation of the vital prin-

ciple, but the result. Is it probable that, light falling upon the eye, and sound upon the ear, must, to bring about their smallest and innumerable effects, necessarily work a material change? If so, what vast destruction—waste! Is it not more probable that there is an impression or impulse given, which in all cases acts upon the organic energy of the tissue to which it is conveyed, and which, though it does not necessarily bring about structural alteration, yet does so in the majority of cases: in short, that an impression being made, it may produce mere modification of the organic energy or lead to organic change?

And thus do medicines act. They may so influence the vital endowment of the tissue to which they are carried, or to which they send their impressions through the nervous system, that mere modification of the organic energy of the tissue follows, or that structural change results; the latter being by far the more frequent effect. But these effects of medicines for the most part differ from those of morbid poisons, lately spoken of, in this; that they are not permanent. The medicines must be present to keep up their effect, or, at all events, their effect does not continue long after the cessation of their use. Yet, though their immediate effect ceases when unsustained by their repetition, they so influence the organic energy as to induce certain changes in the part of a lasting

character and tending to health, but in the production of which they operate only as agents that leave no traces of themselves in their results. Unlike what is generally observed of morbid poisons, medicines can repeatedly reproduce their effects. So that, though the mode of action of medicines and of morbid poisons is in some respects similar, it is widely different in others.

To conclude: we may say that, as certain impressions made upon the formative tissue so alter its action as to cause unusual or diseased products, so do medicines by their impressions upon the formative tissue cause such alteration in its action as to produce through it their salutary effects.

BLOODLETTING.

HAVING spoken of remedies generally, I now come to particulars; and will first notice the vascular system and general and local bloodletting. This system must be regarded in more than one aspect. It is the channel by which supply is carried to the formative tissue, and therefore influences the force, quantity, and possibly the quality, of the material sent. It also conveys the various medicinal sub-

stances to that tissue, and in so doing offers the blood to the action of those substances, by which it is impoverished, enriched, or otherwise changed. Therefore, in relation to disease, this system may be regarded both with reference to its mechanical action, as varied by the degree of the heart's force and of the vascular tonicity, the amount of blood, &c.; and with reference to the operation of remedies upon it and its contents, and upon the tissue to which it conveys them.

By abstracting blood we act directly upon this system, whether the bleeding be general or local. But though the effect of both these modes of taking blood is loss to the body, yet the amount of benefit derived from general bloodletting in inflammation does not by any means depend on the quantity of blood withdrawn; for one large bleeding is much more beneficial than repeated small ones, even if the quantity of blood taken by the former is much less than that which is removed by the latter mode. The advantage is from the sudden abstraction. It is not from the mere loss of blood, but from the decided effect upon the whole system: for in active inflammation, bloodletting does not accomplish its full amount of good unless a strong impression is made upon the system, and, generally speaking, unless syncope is induced. Blood must be withdrawn to an

extent sufficient to diminish the tonicity of the vessels and to lessen the pressure on the nervous centres. The quantity that must be taken away to effect these objects varies considerably; depending partly on the individuals, partly on the nature and stage of the disease.

There is much truth in the remark, so ably illlustrated and enforced by Dr. Marshall Hall, that inflammatory disease of certain parts and structures appears to protect the patient from syncope when bloodletting is employed. But the mere presence of inflammation neither protects from syncope nor demands the abstraction of blood; for while in some cases severe inflammation is relieved by large bloodletting only, in others it is neither needed nor borne. Nor is the matter thus simple; since in the treatment of such cases bloodletting, when necessary at all, may be required in any degree. Indeed, so much do cases and individuals differ, that careful scrutiny, and boldness tempered with caution, are continually necessary to the proper treatment of apparently the same disease and same local change. Leaving other considerations aside, we may as a general remark say, that those who have been robust previously to, and those who appear strong and are under vascular excitement during, the disease, best bear the abstraction of blood. But, so little are these circumstances reducible to rule, that we must be constantly on our

guard: for often a strong man faints after having lost but a few ounces of blood. Yet, as he does not faint from real debility, it commonly happens that after a short interval he bears very free depletion. Again, people of a moveable temperament often faint early, but after a short interval bear the loss of a considerable quantity of blood.

It would appear, then, that inflammation itself does not require, and sometimes does not permit, bloodletting, though it is frequently accompanied by a condition of system which imperatively calls for that remedy.

Before proceeding further I will take a brief view of the process of *Inflammation*. I have neither the intention nor the space to enter fully into its nature.

The first appreciable changes are increased activity of the circulation in the capillaries and smaller vessels of the affected part, and increased afflux of blood to it. The arteries, veins, and capillaries become distended, tense, and even dilated; they admit more blood than is natural, which flows quicker than in health, is altered in character, and enters with increased vigour into the reciprocal actions that ordinarily go on between it and the formative tissue. All the functions of the part are exalted. The sensibility is increased. There is not absolute pain, but the part is uneasy, and is rendered more uneasy by pressure.

This state is one of active congestion, and must be carefully distinguished from passive congestion, which is produced by causes very different from those which give rise to its active form. In duration this state is extremely uncertain. It is often transient; but undoubtedly it may last for a lengthened period. If it is of long continuance, the nutrition of the part becomes seriously affected, and considerable hypertrophy is often the result.

Although this active congestion may exist as an independent condition and be productive of local changes, and may even produce some slight effect upon the system at large; nevertheless, it must in itself be considered as merely an exaggeration of the healthy action of the part, inasmuch as there are no local changes that can be considered morbid, strictly speaking. The blood and the solid parts with which it is in contact still obey the laws originally impressed upon them. There is no perversion. Their reciprocal actions are the same as in health, but are greater in degree. The increased growth is simply the result of excess in the nutritive process. The blood is not materially altered, but its circulation is more active.

It is, however, with reference to inflammation that congestion is important. It has been said that in active congestion the circulation in the part is accelerated, that the vital actions of the part are exalted,

and that the changes go no further. We know no difference between the congestion which may continue such and the congestion which may end in inflammation. The two states appear to be identical. The impression made upon the organic energy of the part is the same in kind and produces the same sort of action in both cases; and whether the action so produced shall go no further than congestion, or shall proceed to inflammation, depends much on the degree of the disturbing force. Active congestion, then, consists in an exalted, and to a great extent healthy, reaction between the blood and the formative tissue. If this reaction becomes disturbed, if the blood becomes disordered in its vital actions, and the relative proportion of its constituents becomes changed; if the tone of the capillaries and vessels of the part (by reason of their augmented supply of nervous power) is increased, so that they diminish in calibre and contract upon the blood; if any of these or like circumstances occur, the state of congestion passes into that of inflammation. We then have a yet greater exaltation of the actions of the part; so great that, being healthy, they become morbid: the uneasiness is changed to pain, even in structures which under ordinary circumstances have but little sensibility; the contraction of the arteries and capillaries is increased; more blood flows to and through the part,

and the quantity, vital properties, and plastic power of the fibrin in that fluid are increased; the temperature of the part, and indeed, of the whole body, is augmented; secretion is for a time more active, but in glandular organs at the very commencement only; and absorption is increased.

These are the first steps in the progress of inflammation. The action of the nerves and vessels and the condition of the blood are not merely exalted, but morbid. The slight exaltation of sensibility has become pain; the tension of vessels, contraction. The action of the heart is accelerated and energetic, and, as the pulse shows, the tonicity of the arterial system is increased. The quantity of fibrin in the blood is enlarged. The animal heat is augmented. Generally, this state of excitement does not last long, and is succeeded by conditions of an opposite character. The capillaries and small vessels lose their tone and show a disposition to dilate; the blood within them grows slower in its progress, and even oscillates; the plasma and colourless corpuscles accumulate on the sides of the capillaries, which, together with the vessels, dilate and contain more blood; the red globules commence to adhere to one another and to the walls of the vessels, and the fluid part of the blood exudes into the surrounding structure. This course may proceed until the vessels become greatly dilated, and capillaries

which should admit one file of corpuscles admit many, and these corpuscles cohere, stagnate, coalesce, and serum and lymph freely exude; until the nervous energy diminishes and pain ceases; until the blood grows dark, the temperature sinks, and secretion, absorption, and nutrition, end. The vital powers of the part are impaired; and if this condition continues and affects a large extent of structure, ulterior changes occur: such as softening, suppuration, ulceration, gangrene. It usually happens that the part is unequally affected at different points. If any considerable portion of the diseased part were the seat of complete stagnation, mortification would be the necessary result. But the morbid action is rarely of such intensity to a great extent; and as a portion when thus endangered is surrounded by others in which some circulation remains, and in which the organic energy and the nutritive process are only slightly impaired or, perhaps, even increased; it is probable that these comparatively uninjured portions, by their proximity or contact, impart to those almost disorganized a vital stimulus which they can no longer directly receive, and which, being thus communicated, saves them from dissolution.

Almost all observers are agreed that inflammation consists in an increased action and vitality of the blood and solids of the part, succeeded by the op-

posite condition. As regards the general course and result of the disease, this notion is correct; but when considered as assigning an uniform course to individual cases, it is very seldom strictly true: probably because the inflammatory action does not proceed at the same rate in every portion of the diseased structure. If it did, and the disease was extensive, the course would be uninterrupted, and the death of the part would ensue. But, after a sufficient interval from the commencement of the disease, we have every variety of state of vessels. One set may be actively congested only, the organic energy of the part being exalted, the vessels tense, the circulation rapid; another set may be more affected, and disposed to dilate, the blood in them oscillating, and its globules adhering to one another and to their sides, and then becoming stagnant and losing some of its fluid part by exudation; another set may be much dilated, greatly reduced in tone and without circulation through them, the blood being much altered and stagnant, fibrin effused, the temperature sunk, and the organic energy much diminished; in another set, still greater changes may take place, the organic energy of the part becoming so low that softening, or even death, occurs. A part of the body, an organ, a membrane, may be the seat of all these modifications at one time: more frequently, however, they do not all exist together.

These modifications, then, seem to account for the very contradictory phenomena observed, and for the contradictory results of treatment. If, on attacking a part, inflammation proceeded equally in every portion of it during the active stage, the phenomena would be unmixed, and our plan of treatment, clear. Again, when it arrived at the second stage, the phenomena and treatment would be perfectly intelligible. But it rarely takes such a course. Its degrees are almost always mixed, and therefore so must be our treatment. It is well for the pathologist to point out the fact that inflammation runs through the two stages spoken of and that they require opposite treatment: but the practitioner soon discovers that, though the fact is well founded, the treatment is not so simple; because the disease is seldom unmixed in its stages, or affects the whole of the part in the same degree. And, consequently, while he bears in mind the fact of the existence of these two stages, and endeavours to make out which predominates, in order that he may apply his remedies; he must not forget that, though the increased action and exalted organic energy of the first stage demand different management from that which the diminished action and failing organic energy of the second require, yet it rarely or never happens that every part of the inflamed structure is alike and equally affected by the complex operations constituting

inflammation: that as the diseased action generally proceeds unequally and there is often present every variety it can assume, his treatment must be varied and frequently appear paradoxical, though really in perfect harmony with our physiological and pathological knowledge, and singularly successful in practice.

Like as in health the blood and nerves carry to every part the material and stimulus necessary to the operations of life, so in inflammation do they furnish the means to the disease. But it is to the organic energy of the formative tissue that the metamorphoses which evince life are due, whether they result in health or in disease: for although changes, physical and of other sort, take place in both the vascular and nervous systems, these changes are for the most part secondary, and arise from disorder consequent upon disturbance of the organic energy of some affected part. But while they are secondary in order, they are of primary importance to the physician, because those systems are the channels for the action of his remedies, whether the action be upon those systems themselves, or, by their agency, upon the formative tissue of the part diseased.

In this place I will speak briefly of the vascular system in reference to inflammation. Soon after an impression capable of causing inflammation is made,

the vessels of the part become disturbed in action, and if, as commonly happens, the organic energy is exalted, the flow of blood is increased and the part altogether becomes highly excited. In accordance with the general fact that excitement is followed by repose, this increased activity is followed by diminished action: the flow of blood through the part is slackened, or in some portions of it is perhaps suspended, and, as a considerable quantity of blood flows towards it, there is congestion. If the impression made is of great intensity, the consequent excitement may be so transitory that the organic energy of the part appears lessened from the first; the disease opening with depression.

Now, it is evident that the general circulation must have considerable power over and effect upon these local conditions, not only by supplying the material whence the products of inflammation are formed, but by acting mechanically upon the affected parts. If the force which propels the blood through the smaller vessels during health remains the same when they are irritable and possessed of increased tonicity, it probably will aggravate their disordered condition; and if the force is greater than in health, it will produce a greater effect. Again, if the healthy force of circulation exists when the small vessels are reduced in tone, the power of resisting such force and

of contracting on the blood and urging it onward is diminished or gone; so that the relaxed vessels are more and more distended by the accumulating blood.

In active inflammation it is commonly necessary to reduce the power of the whole circulatory system. Although this can be effected to a certain extent by particular remedies, such as antimony, for example; yet these cannot supersede bloodletting, which of all the means we possess is the most able to accomplish our purpose. But though bloodletting in some measure produces its effect by diminishing the force of the heart's impulse, that circumstance alone is not sufficient to account for the relief obtained: for, generally speaking, the heart soon recovers nearly, if not qnite, its original force, and the dilated and hypertrophied heart does not appear to keep up inflammatory action more than does a heart of ordinary strength. Therefore, in affecting disease through the sanguiferous system, bloodletting would seem to act at least as much upon the vessels as upon the heart.

It not unfrequently happens that a copious bleeding, by its decided effect upon the circulatory system, ends the disease. Usually, however, the disease is only checked, and may go on to greater severity and pass into the second stage; or may run into the chronic or subacute form, so productive of structural change. The reason of this uncertainty is, that the

mere alteration of the condition of the vessels can only modify the supply of blood, while the essential state of the part is a change in its vital properties. Of course, when blood is taken away, the quantity left in circulation is lessened, at least for a time; and, in consequence, the tension of the vascular system is diminished. But in the majority of cases the original amount is very soon restored by the addition of serum from the general system. The effect of this is to dilute the blood and to tend to the diminution of its increased vitality: for though by this addition the absolute quantity of the blood, as composed of the new products and of its healthy constituents, is replaced, still the relative proportion of its components is changed: and the vitality of the blood being thus altered, the effects of that fluid upon the various organs and upon the system at large are diminished, and so the whole body feels the loss that the vascular system has sustained.

The office of bloodletting, then, is to diminish the pressure made by the heart and arteries upon the irritable vessels, and to lessen the supply, and reduce the quality, of the blood sent to the part—a quality which tends to disturb the entire system, nervous and secretory.

When the second stage of inflammation is fairly formed, the local vessels are more or less relaxed. But

in this, as in the first stage, the remarks on the influence of the sanguiferous system apply. In both cases there is the same necessity for lessened action of that system. In the second stage the smaller vessels and capillaries have lost the degree of tone which gives a proper resistance and direction to the blood as it passes into and through them. But the action of the heart and arteries remains at least undiminished and urges the blood onward with quite the natural force. The smaller vessels and capillaries, which are not in a state to resist that force, yield, dilate, and receive more blood, which stagnates. As in the first stage, it is obvious that the power of the heart and arteries should be lessened, in order that the local vessels may have the opportunity of recovering their ability to contract on their contents: for so long as the blood is thrown into them with force they are under a very unfavourable condition for such return to their functions. In this state, as in the previous stage, bloodletting is the remedy. It is equally as necessary in this as in the first stage that the heart and arteries should be acted on decidedly; nay, though the organic energy of the inflamed part may be somewhat diminished in this second stage, the whole system, in common with the blood, is in a state of greater excitement than in the first, and even more than in it, blood may be abstracted with advantage.

Although the condition of the minute vessels of the part is opposite in the two stages, yet it is evident that the strong impulse of the circulating fluid will equally tend to increase the disorder in both. In the first stage the impulse and supply of blood tend to augment and perpetuate the local affection by the mechanical force exercised upon the vessels and by the large supply of material given to the part, which conduce to exaltation of its functions. But this exaltation is soon followed by want of power, exhaustion, and comparative repose. The local vessels have lost their tonicity, and the organic energy of the part is altered and impaired. Whatever share that tonicity might have had in aiding the passage of the blood through the part is very much lessened or lost; and together with the diminished tonicity of vessels a considerable change has taken place in the power of the part itself to move the blood onward. Now, if into a part so reduced in organic energy blood is still forced, things must grow worse; and yet the force of the heart and of the arteries generally has become greater, the blood has more and more changed, and the excitement of the whole system has increased. Therefore, however important bloodletting is in the first stage, it is at least equally so in the second, in which the part has suffered more and the system is more affected. Although in the advanced second

stage the blood passes but slowly, or not at all, through the vessels of the diseased part, yet the vessels around it, having to bear away the superfluous supply of blood, become seriously disturbed in function, and this disturbance is quickly followed by diseased action. The augmented supply of blood alone is sufficient to induce the inflammatory process; but when that blood is loaded with morbid products and is brought to a part in proximity to the diseased structure, the chances of morbid action being set up are much increased; and probably this is the rationale of the spread of inflammation.

In the second stage of inflammation, then, we not only have the reasons for depletion which pertain to it, but also those which pertain to the first, since that is almost always going on in the parts around.

On the withdrawal of blood, the inflamed spot is less supplied, the mechanical force acting on the capillaries is diminished, and consequently those vessels have the opportunity of recovering their tone, or at all events they have a considerable obstruction to doing so removed. The parts around are also relieved; and the operations of the nervous system are less interrupted. Thus the parts assume a disposition towards health, and the organic energy comes into play and completes the recovery: for it seems to be a law of the economy that, in the event of a favourable

termination, this energy, on receiving an impulse through either the nervous or vascular system, proceeds in some abnormal course until another impulse acts upon it and suddenly recalls it to its normal operation; or that, after the first impulse, the organic energy pursues its unhealthy course until exhausted it languishes, reposes, and then returns to health. But certain it is that these changes are sudden, and that under particular circumstances, difficult to understand, the organic energy will sustain considerable assaults without deviating in any degree from its normal course of action.

It is highly probable that up to a certain point the abstraction of blood, by lessening its richness and high vitality, produces so beneficial an effect upon the whole system as thereby to establish some degree of healthy tone and action in the part diseased.

In connexion with bloodletting is to be noticed *the pulse*. In acute inflammation the pulse is, for the most part, increased in force and power, because the artery is increased in tonicity and firmness. When this condition of the pulse exists, bloodletting is in general required, and when it does not exist, bleeding is unnecessary.

That the state of the pulse in a great measure depends on the condition of the arteries is shown by various circumstances, and is especially seen in cases

of great loss of blood. In these instances the heart beats vigorously, the pulse is large and full, and often assumes a degree of firmness which it does not really possess. Though the heart's action is in few cases more vigorous than in these, the pulse, notwithstanding its full and throbbing character, does not sustain pressure; for the artery is relaxed. Indeed, the finger on firmly pressing the artery will find it comparatively empty after the pulse-wave has passed, and will very generally perceive a "back-stroke" immediately following, as if the vessel had been over-distended, but had quickly contracted upon its diminished contents. The apparent bulk and force of the pulse would seem to depend on the excited heart propelling a lessened quantity of blood through arteries which are flaccid by reason of their imperfect adaptation to their diminished contents: for when the powers are depressed, or the body so suffering that life is in danger, there is nothing improbable in the supposition that a structure which possesses the peculiar properties that the vascular is known to possess should have some of these properties—as its tonicity—impaired or lost. The hardness and firmness of the pulse observed in some diseases cannot arise from the energetic action of the heart alone: for however powerfully that organ may act, its force cannot be very far communicated along the arteries unless they are

proportionally tense and rigid. In those states of the system, therefore, in which the pulse has acquired unusual firmness, it is probable that the arteries are somewhat rigid and do not dilate to their usual extent. It may also happen that the heart does not act with greater vigour than natural, and yet that, in consequence of rigidity and tension of the artery, hardness is given to the pulse. Hence it would appear that though the heart alone is unable to give hardness to the pulse, the arteries can do so if the heart acts merely with its usual force.

The state of the pulse, then, would seem to be a pretty correct guide as to the propriety of bloodletting; since it shows with tolerable accuracy whether the condition of the circulatory system that tends to aggravate the local affection and to excite the frame at large exists or not. But like every other guide in medicine, it may mislead. The judgment must be exercised in every individual case. In inflammation of an important part, as the abdomen or head, it occasionally happens that the shock to the system is so great that the pulse is slow, small, and even weak, but rises in volume and firmness if bleeding is employed. Here the great importance of the part, and the known effect of its sufferings upon the system at large, will lead us to deplete. By the local disease the whole system is depressed, the heart and vessels included,

and bloodletting, by relieving the disease, for the most part so far enables the system to recover, that reaction occurs and bleeding is again required. This depressed condition of pulse is likewise seen when there is great impediment in the lungs from extensive inflammation. But here, too, the necessity of bleeding is apparent not only from the existence of inflammation, but also from the congested state of the organ, which is known to cause smallness and weakness of pulse, and to be benefited by depletion.

It is probable that depression of the pulse and its opposite condition of firmness and hardness both depend on the extent and severity of the disease, or on the peculiarity of the individual, rather than on the anatomical nature of the part attacked: for sometimes a particular structure is affected, and a weak, small pulse is found, with general depression; at other times, the same structure being the seat of action, there is a full, hard pulse and general excitement.

From the foregoing remarks it seems that the propriety and expediency of bloodletting are to be chiefly gathered from the state of the heart and vascular system. On the one hand, we have to relieve the excitement, and on the other, to remove the oppression, which inflammation produces in them, in common with the rest of the body.

It may be said to be true that the firmness of the

pulse is the best test of the expediency of bleeding, and that the firmness depends on the contraction—the tonicity—of the arterial system: for even if there is a full quantity of blood in circulation and this tonicity is impaired, a small loss of blood will be followed by fainting, depression, and exhaustion; which are caused not so much by the loss of blood as by the diminution of that tonicity of vessels which enables them to contract upon the blood and assist the heart in propelling it with sufficient force to the various parts of the body, especially to the brain. But even if the quantity of blood in the system is small and the pulse unusually firm, bleeding, by bringing about a diminished tonicity of vessels, will relieve the heart and give rise to a full and soft pulse. But if the quantity of blood in the system is small and the pulse not firm, bleeding, by lessening the tonicity of vessels, will cause a feeble, fluttering pulse; the heart, in consequence of impaired resistance in the vessels, being unable to urge the blood with proper vigour through the flaccid tubes.

Therefore, though it is allowable, and indeed often essentially necessary, to bleed where the pulse is small, it must at the same time be firm; it must give to the finger the impression that the artery is full, is contracting upon the current. When this small and firm pulse is met with, the inexperienced will do well to

listen to the heart, which will be found beating with force, as if labouring to overcome a difficulty, as is indeed the fact. But after blood has been withdrawn, the difficulty ceases and the heart beats with freedom.

A large and moderately firm pulse will not bear bleeding so well as a small, firm, hard pulse. In the former case, bleeding makes the pulse larger, wavy, extinguishable under slight pressure, and often soon induces syncope: in the latter, bleeding renders the pulse full and soft, but does not easily cause fainting. By a number of small bleedings a very considerable quantity of blood may be taken away without endangering life; but if a large quantity is withdrawn suddenly, death may occur. In the former instance the vessels have time to contract; in the latter they have not.

There is no question that the first bloodletting has more effect on the disease than any that is subsequently practised. With regard to the quantity of blood removed: we should bleed till the pulse is fairly affected and the patient feels relief. But we must not be thrown off our guard by early failing pulse or syncope: for, as remarked before, these occasionally happen from some cause unconnected with the loss of blood, and then, after a while, they go off and depletion to a large amount is borne.

The beneficial effects of bloodletting are more dis-

tinctly seen in inflammation of serous than of mucous membranes; and, on looking at the physiological peculiarities of those structures, such a result would be expected. The mucous membranes admit varying quantities of blood, and at times are so loaded with it as to appear to be closely bordering on inflammation; yet this state quickly subsides and leaves them unaltered. There is, however, a limit beyond which this congestion becomes inflammation; and as the ordinary function of these membranes requires a close approach to such congestion, they are prone to inflammation; in which, however, free depletion is commonly less necessary, and is less likely to cut the disease short, than when parts less liable to vascular excitement are affected. Yet depletion is sometimes very useful. In the serous membranes the blood does not circulate so largely, and its quantity is not liable to such variety, as in the mucous membranes; and, consequently, when inflammation occurs in the serous structures great disturbance of the system is experienced, and bloodletting is followed by very evident advantage: for, as is not the case with the mucous structure, the vascular derangement of the serous membrane seems to be much influenced by the state of the vascular system; and if the force of the general circulation is subdued, the local affection lessens and subsides.

Inflammations of the mucous and serous mem-

branes are the types of inflammation in general, the characteristics of the disease as it occurs in other structures being dependent on the degree in which the peculiarities of the one or other type prevail.

In letting blood we must be careful to measure the effect; lest in attempting to restore the balance overturned by excessive action of the circulatory system we run into an error in the opposite direction, by so lowering the force of the circulation as to allow the nervous power to be in excess. This is especially the case in rheumatism and other diseases in which the vascular excitement is greater than can be accounted for by the local inflammation. An agent so powerful as bloodletting must have its dangers as well as its advantages, and should not be incautiously used. In health the quantity of blood in the body has a direct relation to its wants. Each part is supplied with it in proper quantity and quality, and if from any cause these relations are disturbed, the whole system feels the irregularity and is unsettled. When the blood is impaired in quality by depletion, each organ to which it flows becomes disordered in function; so that the changes caused in the blood, and the products derived from it—in fact whatever results follow the mutual reaction of the organ and the blood—are imperfectly effected: and though the power of nature to adapt herself to the manifold

alterations occurring in our bodies is great and rapid, still the physician must not presume too much upon that power and call it to needless exertion. Although the consequences referred to do not arise if the depletion is moderate, and perhaps, unnecessary; yet, when it has been used unsparingly, they become very evident, and produce a degree of feebleness and derangement of system difficult, if not impossible, to remedy; under which the blood circulates languidly, and therefore irregular distribution and local congestions are apt to occur: as evidenced in cold extremities, flushed and then pallid surface, passage of blood by the bowels, &c. Such consequences are most frequently seen in those general diseases in which bloodletting has been freely used for some local affection not inflammatory which had assumed many of the characteristics of active inflammation. Sometimes it happens that, from pushing depletion too far, inflammatory action ceases, but its physical signs remain, or even increase. Crepitus, which indicates the physical condition of the lungs both in inflammation and in œdema, and which though not identical in the two cases is sufficiently like to mislead the incautious, illustrates this.

Thus by the activity of our treatment we may produce symptoms analogous to those of the disease (and perhaps even certain forms of the disease itself) which

our remedies are intended to suppress, and carry our antiphlogistic measures so far that the affected organ, instead of being relieved, becomes more seriously injured by the progress of morbid changes less active in character, but equally fatal. But though the signs in the suffering part are pretty much the same in both cases, the condition of the general system will direct us to employ a different, and perhaps opposite, treatment.

In the treatment of acute inflammation the practitioner too often loses sight of the general principles which should be his guides. It is too much the practice to bleed, give mercury, and administer various antiphlogistic remedies, as a matter of routine; to treat the disease in a particular manner, because, from the category of symptoms, it bears such or such a name; and to neglect in a great measure the condition of the patient, under the notion that if the disease is cured, he is safe. But this is an error which springs from associating a particular mode of treatment with particular diseases. For the convenience of teaching, the dogmas of the schools are very, and perhaps necessarily, one-sided; and many men who learn them never disabuse their minds of the fallacies received. With such, inflammation is intimately associated with antiphlogistic measures, while the powers of the constitution are unconsidered.

For though in theory inflammation should, on attacking two persons in previous good health and apparently of similar vital power, run the same course and yield to the same treatment; yet in practice it is found that this position is untrue. We may, indeed, go so far as to say, that there are no two persons alike in all particulars, and to whom precisely the same treatment can be with equal benefit applied. On the full appreciation of this fact, much of the success of the experienced physician depends. His practised senses quickly detect and seize the peculiarities of his patient. With him, every case forms an exception to his rule; and, though always governed by his general experience, he invariably considers the individual character of each instance of disease.

It should always be remembered, that though, at its commencement and during a great part of its course, inflammation is pretty generally the same, so far as regards its local action, it is still variously modified, as to its products and results, by the general state of the system; and that when it is subdued, the patient is not necessarily safe: for, the stimulus of the disease being withdrawn, and its wasting effects having made deep inroads on the frame, sinking often follows. We find, in short, that to cure

the disease is by no means the same thing as to cure the patient.

In determining at the commencement of a particular case whether local or general bloodletting should be employed, we must consider the state of the system at large. If there is no general disturbance, local bloodletting will usually be sufficient: but if there is much systemic excitement, general bleeding will be necessary. Indeed, so long as there are a firm pulse and manifest excitement and increased tonicity of vessels, the period at which local bloodletting relieves has not arrived. Unless local depletion is carried to a very great extent, it has little or no effect upon the condition of the system, though it may, for a time have considerable effect upon the local disease; which effect, however, is very soon counteracted by the injecting force of the vessels. To have the full advantage of local bleeding, we must reduce the excitement of the circulatory system by general depletion.

Yet, though the objects and effects of local and general bloodletting are in many respects different, these remedies are often required in conjunction: for it not unfrequently happens that general bleeding, though large and having a marked effect upon the whole system, fails to relieve the local fulness of

blood: the injecting force has been diminished, the volume and richness of the blood have been lessened, but the part affected—either from want of tone in its capillaries, or from its organic energy being excessively excited, or on the contrary, exhausted—is unable to unload itself and resume a healthy action. Under these circumstances, the local abstraction of blood is not only highly useful, but absolutely necessary; since, if it is omitted, the morbid action will proceed, again, as it were, lighting up the system and calling for a repetition of the general bleeding: or the part affected will become the seat of alterations in a great measure confined to itself and varying much in degree of organisation.

Local bleeding is by no means limited to the narrow sphere of a secondary agent to general depletion. In certain states of the system, though inflammation is going on in some parts of the body, general bloodletting is not only unnecessary, but dangerous: yet the disease is making rapid progress towards disorganisation, and is disturbing the whole frame both by the matters it throws into the circulation and by the local irritation it sets up. Under such circumstances, there is need of a remedy which shall produce a decided effect by removing the blood from the overloaded vessels and by giving them an

opportunity to resume their tone and function. And this local bleeding will do.

The two means of local bloodletting—cupping and leeching—have many points in common, but can seldom be used indiscriminately for each other. Cupping can take blood in large quantity and quickly, and can thus make an immediate and decided impression upon the diseased part; and, if freely employed, may affect the system at large. Indeed, some of its consequences differ but little from those of general bleeding, except in the circumstance that, as cupping takes the blood from the circulation in an indirect manner and less rapidly than venesection, the sudden and general effects of loss of blood are not usually produced. Yet still the loss is sufficiently direct and rapid to cause considerable and quick effect upon the entire system. Cupping appears to do for a part of the body what general bleeding does for the whole: that is, to suddenly abstract a large portion of the blood of the part and produce a decided impression upon the local organic energy. Therefore it is peculiarly beneficial in cases in which the local disease is active while there is such want of power in the system as to render general bleeding inadmissible. Cupping, then, does for the part what general bloodletting would have done, but it does it

without the evil consequences of loss of blood. Cupping has also considerable derivative properties; and even dry cupping is often of much service.

Many of the remarks made on cupping are applicable to leeches. Their effect is the same in kind, but less in degree. When the part affected is tender or difficult to reach, or when only a small quantity of blood is required, leeches are preferable to cupping, and may be of great service.

It is an interesting point to determine to what extent local bleeding may be carried in a debilitated state of body, or, at least, in cases in which the pulse by no means indicates stress upon the vascular system. Under such circumstances, except in extreme cases, the pulse is no guide. The vascular action, tenderness, pain, &c., in the part will best inform us how and when to use the remedy. But we must be careful not to attach too much importance to pain, which should be accompanied by other signs, as tenderness; before we decide that local bloodletting is necessary. Pain alone often denotes mere irritation, to be relieved by other means. The pain attendant on inflammation is generally at an end when the diseased action is subdued: but sometimes it remains, giving great alarm to the patient, and occasionally misleading the physician. A full dose of opium will remove it.

Thus far we have treated of means which act in a direct manner upon the circulatory system. We now come to speak of some agents which enter the blood and produce various effects upon it, and upon the formative tissue to which they are sooner or later carried; and also to notice some which may or may not enter the blood, but which act particularly upon the nervous system, and through it likewise affect the formative tissue.

MERCURY.

Mercury is perhaps the most useful and powerful medicine we possess. Its sphere of action is very wide, extending over most of, if not all, the organic operations of life. Therefore in its effect upon them we see this agent's power, which we use for the correction of their disorders. The vascular system, being the channel by which mercury is conveyed to the arena of its operation, demands our first attention.

The *blood* may in many respects be looked upon as flesh in an early stage of formation; and, although its nature is complicated, it generally speaking keeps much the same state of composition, notwithstanding

the variety of substances it receives. Our present interest in it, however, is confined to those parts of it which are closely allied to the solids themselves: namely, the red and colourless corpuscles and the fibrin and similar compounds.

Modern physiology has made it clear that organic life is carried on by corpuscles, and therefore local changes must be attributed to them, especially when they are present in large numbers and are accompanied by phenomena which they are known to be able to produce. The blood is abundantly supplied with these bodies, which perform in it, to some extent, the same sort of function as the analogous bodies do in the solids. It is not probable, however, that the blood possesses so high a degree of vitality as the solids which it supplies, but that it is simply able to impress with a vitality similar to its own the new material which it is constantly receiving. The degree of vitality of the blood seems to be greater or less in proportion as the red corpuscles are abundant or deficient. When they become preternaturally large in quantity, inflammatory disease is apt to arise: when they become unnaturally small in quantity, anœmia and feebleness follow. It is improbable that fluids, properly so called, should possess vital properties. Those of them which show such properties —as blood and semen—contain corpuscles, and they

are the seat of the vitality. Blood, then, may be assumed to be an essentially vital fluid; its vitality being seated in its corpuscular part.

By most persons it will be admitted that mercury enters the blood. A very remarkable case illustrative of this is mentioned by Dr. Locock, on the authority of Mr. Keate, in which a gentleman, who could not take mercury in any other manner, drank the milk of an ass to which nitrate of mercury had been given, and was affected by the mineral in a marked manner. Mercury, on entering the system, acts upon the vital portion of the blood in the same way as it acts upon the vital solids at which it ultimately arrives. Dr. Samuel Wright (quoted by Dr. Christison, in his Dispensatory) found that when the system has become affected by mercury "the blood is materially changed in its constitution; that it is rendered more watery, more prone to putrefaction, less charged with albumen, colouring globules, and fibrin, and loaded with a very fetid, fatty matter." And common experience shows that the full operation of this agent is followed by pallor.

It would thus appear that whatever may be the action of this remedy the result is lessened number of the corpuscles, which tends to a lowering of the vitality of the blood and of the solids in general. Hence the great debility which follows the use of

this mineral, especially when it has been employed freely, or has sharply affected the system.

So intimate is the connexion between blood and solids, that actions going on in the one speedily affect the others. Consequently, as soon as mercury has affected the blood, its influence is felt upon the *formative tissue* with which it is brought into contact. But it does not appear to be absolutely necessary that mercury should enter the circulation, in order to reach, or at all events to influence, the formative tissue. The dispersion of incipient bubo by mercurial ointment, the cure of orchitis, of external enlargements, of enlarged joints, &c., by the local application of this remedy give colour to the belief that its effects may be produced without the intervention of the system. But when mercury has entered the circulation, its sphere of operation is enlarged. It meets with every variety of condition that the formative tissue is capable of assuming, and is able to influence every act of which that tissue is the prime agent; and thus is every organic function of the body liable to its action. In some degree its effects vary with the quantity taken and with the time required for its operation: so that, in common with many other remedies, it appears to display powers of quite opposite descriptions. In one case it will cause febrile excitement, emaciation, blood-

lessness; in another, improved tone and secretions —increased nutrition and strength. Yet, this difference of result will not seem surprising, if we reflect that the agent affects the organic energy and modifies it in an extraordinary degree: in the one case by the great force of the remedy, in the other by its slow and mild operation, causing the changes necessary to the normal state. In fact, the operation of mercury upon the human frame in an inflammatory state of the system is two-fold — antiphlogistic and reparative: the effect depending on the quantity given, the nature of the disease, &c. Its antiphlogistic operation is best seen in the inflammatory diseases of the Tropics; diseases which run a rapid course and terminate fatally chiefly through the great local disorganisation they produce, but which, it is the general opinion of those who are best able to judge, mercury in large doses is capable of arresting.

To the foregoing remarks it may be objected, that it is assumed that mercury is always ultimately beneficial to the system and the part diseased: that when there is too much action, the remedy subdues it; when too little, it excites it: that although its operation varies, it always tends to good. This, however, is not assumed; but it is assumed that the remedy is given judiciously, at the proper time and in the proper quantity. It is admitted that mercury does

at times act injuriously; but this may arise from many causes, and is frequently counteracted by support and such means as prevent the excessive depression which the mineral, under certain circumstances, has a tendency to produce. It may thus happen in cases apparently ill-suited to this agent and in which it even disagrees, that under an altered state of system brought about by appropriate treatment, the local disease, before aggravated, is benefited by the remedy.

It is evident, then, how great should be our care and observation before we condemn and give up agents known to have such or such powers, and how much it behoves us fairly to test those powers under every variety of circumstance.

Much of the bad reputation and many of the evil effects of mercury depend on the difficulty we have at times in regulating its influence, and on individual peculiarities. The practitioner often takes alarm at one case that goes wrong, though he has had many that have gone right, and often blames the remedy when he alone is in fault. Indeed the bad results from mercury are chiefly the consequence of its improper use. If the patient is full of blood and power he will bear a freer use of it than if he is weakly, though weakness does not of itself forbid its use. The mode and quantity in which it is employed must

be accommodated to the exigencies of the case: and when severe inflammatory disease happens to debilitated persons, our remedy must be administered with care, lest it outrun our intention.

It is probable that mercury operates by inducing a peculiar action in the formative tissue: that as the nutriment brought to this tissue by the proper channels causes certain acts of a vital nature; that as electricity and other imponderables stimulate or alter its action; that as certain morbid poisons conveyed to it in various ways bring about in it definite morbid results; so also does mercury produce in it particular changes of a purely vital nature, as definite in kind and sure in result as any of those just mentioned, and which are allowed to be of a purely vital kind. It is no argument against this view to say that mercury is generally given to check the progress of a local disease, whereas, according to the suggestion offered, its effects would be spread over the entire formative tissue of the system: for the experience of every practitioner who has used the remedy must abundantly prove the universality of its action. The alterations of the pulse and secretions are evident proofs of the system being affected; indeed by many it is supposed that the good effects of the remedy are not in operation until these evidences appear.

It will be admitted, then, that mercury operates

without distinction upon the whole of the formative tissue of the body. But whence is its power over the action of the diseased part in particular? The mercury affects the formative tissue of the part in common with that of the rest of the body; but in the part, action is more vigorous, and the products are less organised and more easy to be absorbed, than in the system at large. Hence it would be expected that the remedy, though it affected the whole body, would exercise most power over the part in which the action was greatest and the products least organised; because it appears to be a law of the economy, that the parts most recently formed are those most subject to disintegration and removal, and that the actions depending on excess of vitality are those soonest brought to the standard of health.

The effect of mercury upon the vital acts of the body in general must also influence the diseased part: for, as the body is a whole composed of portions, each intimately related to the rest, it is not possible but that a part, however affected, must feel what is going on around it; and, as the tendency of mercury is to lower the vital power and cool the ardour of the general system, it follows that such effects must be felt in the part diseased.

The depressing effects of mercury are seen in various consequences of its employment. In di-

minished nutrition and emaciation of the whole body. In decrease of the red corpuscles, fibrin, and albumen of the blood. In the results of its attacks upon the glandular structures, the functions of which it alters, probably by lowering their vital powers: for may not inordinate secretion in a gland arise from the falling off of its most superficial cells, which, being of comparatively low vitality, are but feebly attached to the rest of the organ so long as that vitality exists, and are quickly detached when it is lost in consequence of the vital properties of the entire gland becoming impaired by the mercurial action; the cells so falling off being renewed by others which in their turn fall away: so that a large and increased secretion from the organ is caused by its lessened vital power? The depressing effects of mercury are further seen: In the occurrence of phagedæna, if there is a tendency to it; or in the increased rapidity of its destructive progress, if it already exists. In the general debility and aggravation of local change which occasionally follow the exhibition of this agent; as is seen in some diseases of the eye, iritis for example, in which, the more the mercury is pushed, the more the mischief spreads, the greater is the deposit of lymph, and that of a low form, not readily organisable, often not at all. In the tendency to deposition of scrofulous matter. In

the production of a peculiar order of affections called mercurial diseases, all of which are distinguished by depression of the vital powers; as mercurial fever, mercurial erythism, &c. In all these cases the agent appears to produce its poisonous effects by lowering the tone of the system.

As mercury has such influence over the vital acts, it evidently may modify them in various ways; and its operation may be such that the organ affected by it may show increase, decrease, or disorder of function. In the liver, for instance, the normal action may be increased or decreased, or be so perverted as to form products unhealthy or unusual. But in most cases the remedy may be made to slowly produce changes of a beneficial kind. For example: an organ has been subject to inflammation and has undergone considerable change; new products have been effused into its substance; it is damaged, and no longer performs its functions as it should. Yet the diseased action has long ceased in the organ, which is merely left injured. If this state of things is neglected, the organ most frequently never recovers its former condition; the deposit within it becomes part and parcel of it, impeding or altogether interrupting its function. Again, the liver or intestinal canal takes on diseased action, the secretion is rendered extremely unhealthy, and after a time the functional derangement ends in

structural change. A secreting organ, like the peritoneum or pleura, is slightly inflamed, and goes on secreting until its structure is altered, the neighbouring organs impeded, and the general health impaired.

Now, in all these cases, unless there is some peculiarity in the individual, mercury in small doses produces surprising good: causes absorption of the deposit in the substance of the organ, and enables it once again to carry on its functions; corrects, as by a charm, the faulty secretion and its accompanying evils; removes effusions which had taken long to form, and brings back the normal structure and function of the diseased parts. The power of mercury, however, to cause the removal of deposit and effusion is not only evidenced by the partial or entire recovery of the patient from the consequences of internal disease, but is capable of demonstration in iritis and other diseases of the eye, in which a particular state of vessels is observed, certain organic changes take place, lymph is deposited, and things go on from bad to worse. Mercury is given, and when the system becomes affected by it, the progress of mischief is stayed and the morbid products steadily disappear, until reparation is perfect.

The value of mercury in inflammation is most evinced when depletion has done its best. In fact,

depletion, unless it sweeps away the disease at once, does little more than moderate the vascular excitement. It checks, but does not cure. The mischief goes on, and to a certain extent is accomplished; the urgent symptoms subside, and the patient is said to be cured. But the function of the organ is not performed as it used to be; in a word, organic change of greater or less extent has happened, and in consequence the action of the part is never again perfect. Antiphlogistic remedies, mercury excepted, leave the part to the chance of cure by nature: they, as it were, suppose that after the activity of disease is gone, then come repair and restoration. But every day's experience teaches us the error of this view. When disease is once originated, the tendency is to change, and when change is accomplished, activity subsides and leaves altered structure behind. Now, in the treatment of disease it is necessary to continually remember the great obligation we have to place the organ as nearly as possible in its healthy state; and in the treatment of a case our object should be not only to check and stay the disease, but to leave the part in the condition in which it was before the attack—not to relieve and patch, but to cure in the fullest sense. Therefore we must not be satisfied with subduing the disease and leaving the reparation to nature (though nature may often be sufficient), but must aim to effect

the entire restoration of the part: and in the whole range of materia medica no means of achieving this is comparable with mercury.

The effects of mercury being such, what is the rationale of its action? In the present state of our knowledge, this is quite obscure. How it is that the remedy at one time allays action when in excess; at another, stimulates it when languid; at another, restores it when perverted; and, indeed, how all the marvellous operations of this agent upon the whole of the vital acts of the body in general are effected; is at present unexplained. All its compounds bring about precisely the same results, except in rapidity and degree. If these results depended on some chemical process, they would vary with the compound used; whereas we find that mercury, whether combined with oxygen, chlorine, sulphur, cyanogen, or iodine, produces the same specific effects. Therefore, it is reasonable to suppose that these effects arise from the metal itself, rather than from the nature of its chemical combination.

It would seem, then, that mercury acts upon the organic energy of the formative tissue, not chemically (though chemical changes may arise as consequences), but in a manner similar to that of the imponderables. An impression is given, and the acts of the part are altered, not by any chemical effect of the remedial

agent upon the tissue, but by the peculiar operation of the agent upon it, and so upon its organic energy. One word more. In some persons even very small doses of mercury always cause violent symptoms. Now, if the mercury acts chemically, how is this to be explained? For in a chemical point of view there can be little difference in individuals. If it is to be explained by the supposition of some peculiarity of constitution, the agency of the organic energy must be admitted, and the action of mercury upon that energy must be admitted also.

The formative tissue being the allowed seat of operation of mercury, let us trace the action of the remedy in some important organs.

An opinion generally held is, that this agent has a specific action upon particular organs; and in a certain sense the opinion is well founded. We daily see that it greatly affects the function of, and even causes diseased action in, the salivary glands, the liver, the intestinal canal, &c. But is this action of a specific nature? Has the mercury a specific power over these parts? In my judgment it has not. I imagine that in its operation upon these structures it only follows the law that regulates its action in all other parts of the body; that it acts upon these particular organs on the same principle as that on which it acts upon every other part, and for precisely the

same reasons. In speaking of its effect upon the formative tissue, it has been said that its power is spent in altering the organic energy of the cell-like corpuscles of which that tissue is composed, which pervade the whole body, and in which and by which the whole of the organic operations of life are performed. Now, numerous as these corpuscles may be elsewhere, they are much more so in the organs named; and active as the vital operations may be elsewhere, they are more so in these organs. Now, if the action of mercury is mainly spent upon these corpuscles, it is to be expected that its effect will be most powerful and evident in parts in which these bodies are most numerous; and so it is. The liver, salivary and other glands, and the intestinal canal, are the parts principally affected when the remedy is in full operation. Yet it would appear that mercury does not choose these organs for its special operation, but that, they being the great depositaries of the corpuscles upon which it chiefly acts, its marked effect is necessarily manifested in them; or rather that, as the mercury diffuses itself throughout the system, and as these corpuscles accumulate in particular organs, the greatest action of the mercury, and consequently the greatest modification and disturbance of function, will be found in those organs in which the corpuscles most abound.

Mercury, then, does not show any preference for certain organs, but merely follows the course of the circulation which directs it, just as to other parts, to the organs in which the bodies especially subject to its action are most abundant, and in which, as a consequence, its power is more manifested than in other organs which possess fewer cells. Therefore, though it is true that mercury acts peculiarly and powerfully upon particular organs, this action depends on the anatomical structure and the function of the parts.

Modern physiology has demonstrated that glands may be regarded as mere surfaces: that their structure is complicated in order that these surfaces may be packed into a small space. The secretory duct ultimately divides into exceedingly minute branches, and these constitute the greater portion of the gland. Upon the surface of the branches of the duct are placed the corpuscles which serve so many purposes in the animal economy, and, in the case of the gland, that of secretion. Although these bodies vary but little in appearance in the different glands, yet they form different products; take up the materials brought to them by the blood and convert them into the secretion peculiar to each gland. These bodies are all more or less affected by the same agents. Their functions are essentially vital—mainly those of conversion and elaboration. When they are placed on a

surface, their office is to secrete ; when in the interior of organs, to nourish. By the glands the blood is in a great measure purified, and also by them are elaborated materials for ulterior purposes in the economy. They are all largely supplied with blood, and the amount of vital action proceeding in them is out of all proportion greater than that going on in other parts of the body of similar size. The blood is chiefly distributed to their secretory portion.

On considering what has just been stated, it would be expected that, when the system becomes affected by mercury, the influence of that agent would be first shown in the glands, and that their derangement would be evinced by some alteration in their secretion. And so it happens. The earlier effects of mercury are increased flow of saliva, urine, bile, intestinal secretion, one or all. But though the parts whence these secretions come are almost simultaneously affected, their derangement does not advance in the same proportion. In some of them—as the liver and kidneys—the disorder appears never to go on to disease and destruction ; while in others—as the salivary glands and intestinal canal—disease is often excited, and extensive injury produced. It seems, then, that the first effect of mercury upon glands is to increase their function, but that it subsequently has a tendency to excite disease, which in some of

these organs is certain to occur if the mercurial be pushed.

The early *soreness of the gums* is familiar to every one; and though it is a diseased action, and therefore in itself undesirable, we nevertheless endeavour to induce it, because we require some test as to the extent to which the remedy is operating upon the system, and the soreness of the gums is the best we have. But while in acute diseases it is often necessary to touch the mouth in order that we may be more sure that the system is affected by the remedy, the amount of good produced is by no means to be measured by the degree in which the gums are affected. There are cases in which it is difficult or impossible to produce salivation, and by many it is supposed that under these circumstances the system is uninfluenced by mercury. This, however, is hardly correct: for in these cases we shall on careful enquiry find that the effect of the agent has been shown upon some part, the warning been neglected, the remedy pushed on as if no such warning had been given, and, as happens when the presence of salivation is unheeded, disagreement and distress have resulted.

The action of mercury upon the *liver* is, both as to frequency and importance, second to none of its operations. The increased flow of bile proves that this organ is early affected, and the flow is not unfre-

quently so great that copious bilious purging arises; which, however, must not be confounded with the proper purgative effect of the remedy. This well known action of mercury upon the liver has given rise to much empiricism in the use of the remedy in disorders of that organ. Whether it be torpid, congested, or in a condition of anæmia; whether its action require stimulation, correction, or repression; mercury is given, and given with success. Seeing, then, that daily experience proves the great utility of the remedy in very dissimilar conditions of the liver, we are not surprised that it should be thought to have what is called a specific action upon that organ. Its early effects, when it has been given by the mouth, admit of satisfactory explanation. They do not appear to arise from preference of the agent for the organ, but simply from the circumstance of its being conveyed to the liver, by means of the portal blood, earlier than to the other organs of similar structure. Thus it is brought to the liver, to which it is presented with other substances from which that organ derives the elements of its peculiar secretion. In this way the mercury reaches the liver under circumstances the most favourable for affecting its vital endowments. It is probable that the mercury not only thus reaches the liver quickly, but that the larger quantity of it at first goes to that organ. If mercury is applied ex-

ternally, or by vapour, it enters the general circulation, and the organs become affected almost simultaneously: the liver, at least, does not in general take the lead.

In inflammation of the liver, the mode of exhibition and the effect of mercury are the same as when other organs are similarly circumstanced. When, however, the liver labours under the manifold derangements of function called "disordered liver," the mode of exhibiting the remedy varies much. Under these circumstances, our object is not to bring the organ or the system rapidly and severely under the influence of the remedy, but to affect them just sufficiently to produce the desired change in their vital actions. In such cases, though the remedy must in some measure affect the whole system, its force is chiefly spent upon the organs in which the greatest field for its operation is found; and in this respect the liver is largely endowed. But while our object is to use the remedy gently and mildly, nevertheless the quantity given must vary with the amount of disordered action, and with the peculiarity of the individual. In the instance of the liver, if the organ is highly congested and extremely torpid, more mercury is required to effect our purpose than if the organ is but slightly disordered, or in a condition wavering between health and disease. In short, we have the

same object in view in every case, whether there be acute inflammation, congestion, torpor, or derangement, and that is to affect the formative tissue; to depress, correct, or stimulate its action.

Next in the order of importance comes the *intestinal canal,* the whole of the surface of which is studded with glands and covered with the corpuscles of the formative tissue. As mercury has such a powerful action upon these bodies, we should expect it to possess great influence over the intestinal canal, and so indeed it does. When the system is about to be affected by it, and even when its purgative effects are guarded against by proper means, the intestinal canal, in common with most other secreting organs, becomes disordered, and we have watery, mucous, or bloody discharge; the glandular apparatus is disturbed, or perhaps takes on diseased action, which frequently proceeds to ulceration.

The advantage of employing mercury in diseases of the alimentary canal has not, I think, obtained the attention it deserves. An error current in the profession is, that mercury is extremely prone to produce, and when present to increase, ulceration of the intestinal surface. Probably this error has arisen from the improper use of the remedy; for doubtless its improper use would cause such a condition. The abuse, however, of any other remedy exposes it to a

like imputation, and if we were to discard every agent that is capable of producing great mischief, we should reduce our armamenta to the merest weakness.

Mercury, properly employed, is as valuable and beneficial in disease of the intestinal canal as it is in disease of any other organ in which its good effects are generally admitted. In disease of the intestinal canal, it must not be given in large, but in small and repeated doses, and the preparation used should be of the least irritating character. To obtain the good effects of the remedy in this disease, we need not always touch the mouth; for I believe that the beneficial effects of mercury occur more quickly in disease of the mucous membrane of the intestinal canal than in any other disease. It is probable that the reason of this is, that as, from the nature of the intestinal structure, the mercury is brought into absolute contact with the formative tissue almost immediately after it has been swallowed, it has not, as in other cases, to enter the circulation before it can reach the structure upon which it acts. No doubt, however, a certain portion of the remedy enters the circulation, and through it affects the formative tissue of the intestine, in common with that of the rest of the body: but the main effect of the remedy in these cases is from its direct contact with the intestinal surface.

Although mercury is generally admitted to have a

remarkable influence over most of the diseased secretions, on none are its effects so speedy and decided as on those of the intestines. It has frequently happened to me to see patients whose intestinal secretions were much disordered, and who had long been subjected to repeated purging for the purpose of bringing away what was supposed to be morbid matter accumulated or being formed in the bowels, in whom the exhibition of mercury in small doses and the cessation from the use of purgatives have been soon followed by natural secretions, and the change from a feeble, feverish, and emaciated state of system to the condition of health.

And here it may be observed that the practice of indiscriminate purging, so commonly adopted to bring away, as it is said, diseased discharges, is based upon a false theory of the origin of these altered secretions. The whole of the surface of the intestinal canal is secretory, and from a variety of causes is very prone to become disordered in its action. The secretions are then more or less altered; and, in consequence, the aliment brought into contact with the surface of the canal is not acted upon as it should be, but undergoes changes which render it irritating to the intestine and pernicious to the system. Now, the administration of purgatives in such a condition as this can do no more than increase the secretion and

cause it to be discharged from the body. It is true that the morbid matter is thus thrown out of the system, but the agent which throws it out stimulates the intestine to fresh action and secretion: so that, though the noxious matter is discharged, the result is obtained at the expense of irritating the intestine and continuing the disorder.

This is confirmed by experience; for we find that the constant irritation of the intestinal canal by purgatives not only does not tend to set the disordered secretory apparatus right, but, on the contrary, stimulates it to disease, and often, in the end, to ulceration. Daily practice proves that in such a state of intestine we may give purgatives for a great length of time, in the hope of bringing away the noxious matter and affording the glands full opportunity to throw it off from the system, but that the longer we go on, the worse things become, and that disease is ultimately certain to result. In fact, the glands, instead of deriving noxious matter from the blood, as supposed, convert the healthy material brought to them through the circulation into diseased products: their action is fundamentally wrong and perverted, and the more they are excited to secretion, the greater in quantity and the worse in quality does the secreted matter become.

These observations do not apply to the adminis-

tration of purgatives for the purpose of clearing out the bowels, but to the practice of purging with intent to improve the secretion by acting upon the intestinal glands. Whenever there is morbid secretion in the intestine, it is obviously necessary to remove it by purgative medicines. It is not against the use of purgatives that I am speaking, but against their abuse — their long-continued employment to remove matters at the time unformed, and which their very operation brings into existence.

Whenever the secretions are deranged, especially if there is a tendency to diarrhœa, mercury in small doses is the best remedy. Under its use the secretions take a healthy appearance, often immediately. If the diarrhœa is considerable, the combination of astringents with the mercurial is singularly beneficial. If with the deranged secretions there is constipation or accumulation, it will be necessary to clear the bowels by a purgative, and to take care that fresh accumulation does not occur; the object being to cleanse the bowels and not to induce active purgation. Yet there are circumstances in which active purgatives are not only useful, but absolutely necessary. But then the condition of the intestine is different from that just mentioned.

My remarks have related to disorder or disease of the secretory apparatus of the mucous membrane of

the intestinal canal, and are intended to show the inutility, and even impropriety, of purgatives as the general remedy for either condition, and to suggest that the proper course of treatment is to act upon the formative tissue of the glandular structure by mercury. But in many diseases of the blood also, especially in gout and rheumatism, the secretion from the bowels becomes much disordered, dark, and offensive; and so long as this state of secretion exists, the disease does not give way. In these cases, the secretory glands of the intestine being the channels through which the morbid matter is discharged from the system, purgatives are much required.

I am aware that the biliary secretion is often much disturbed in these diseases, and that probably there is some relation between them; but the secretion I refer to plainly proceeds from the intestine, and in all probability from the colon; and though both mercury and colchicum have a decided action upon the liver, and thereby do much good in these diseases, still it is mainly by their action upon the glandular surface of the large intestine that they are instrumental in discharging from the system the morbid matters which are supposed to give rise to these diseases. So far as my experience goes, this morbid secretion always accompanies an attack of these diseases and the patient is not cured until it ceases. In

fever, especially when there is some intestinal disorder, the good effect of small doses of mercury is very evident. In all cases in which the evacuations have been deranged, it has been the established practice to give mercurials for the purpose of correcting the disordered action of the liver, supposed to exist. But in the majority of cases the liver does not in reality give rise to the morbid secretions dejected, which proceed from the intestine itself; and the correction they undergo by mercury is due to the action of that remedy upon the glandular surface whence they are eliminated.

The presence of inflammation in the bowels does not forbid the employment of mercury. On the contrary, it is useful in this state. Yet it must be employed with great caution. It should be steadily given, so as to moderately, but distinctly, affect the system. Its action must be beyond that just described — called alterative; for this latter action is useful only when the mere nutrition of a part is altered or perverted. Under such conditions the antiphlogistic effects are not wanted, nay, are injurious by lowering the system: for in these cases the blood is not enriched, as in the more active disease, by matters which mercury has power to destroy. But in inflammation these matters abound; and the state of the formative tissue of the part and the state of

blood are just those in which mercury is most efficient.

In the early stage of *mesenteric disease* I have found mercury to be greatly beneficial. I am aware that it is considered hurtful in this affection, and so it is when the case is advanced. But the disease may even have made considerable progress — the belly being large and the swollen glands distinctly felt — and yet no tubercular deposit be existent. From frequent post-mortem examinations I am satisfied that these glands undergo considerable enlargement which may be properly, and very effectually, treated by mercury: that the condition differs in no respect from chronic enlargement depending on a form of inflammation which yields to that agent's power. Moreover, the state of bowels that frequently accompanies mesenteric disease — by which it is sustained, and perhaps was caused — is greatly benefited by mercury. Its exhibition in small doses for a long period is attended by a very marked advantage.

In common with other organs of similar structure, the *pancreas* is doubtless affected by mercury. But I am not informed of any facts on the subject.

It has been before remarked that when the system is about to be, or just is, affected by mercury, an increase of urine is frequently observed. Therefore the *kidneys* appear to partake of the effect which the

agent produces throughout the system. But this effect upon the kidneys is transient: the mercury does not appear to sustain its influence over those organs; neither does it seem to have any peculiar action upon their diseases.

Although it is not my intention to speak at large of the effect of mercury in inflammatory diseases of the *lungs*, yet I cannot refrain from noticing its remedial power in some forms of inflammation connected with consumption. The early history of phthisis is frequently associated with a certain degree of inflammatory action in the lungs. The disease sets in much in the manner of catarrh, but persists after the more general affection has subsided. The stethoscope reveals sufficient physical signs to place beyond doubt the existence of inflammation at the upper portion of one or both lungs, beneath the clavicle; a spot, though not invariably that in which tubercle first appears, as was once supposed, yet sufficiently often the seat of its commencement to raise a grave suspicion when equivocal signs are there detected. There is a frequent, troublesome, dry cough, or if sputum is raised, it is scanty and tenacious. The strength fails, the pulse rises, the nights grow restless. In a word, the physical signs show a small and apparently trivial local affection while the general system is disturbed out of all proportion to it. Perhaps of all the many

forms which phthisis assumes this is the most fatal and runs the most rapid course. I say the most fatal, because, though phthisis has undoubtedly a fatal tendency from first to last, its progress is often so slow that a person labouring under it lingers on for many years, and is then carried off by some other disease. This is by far the most frequent form in the young. A low character of inflammation wherever found, especially in the lungs, and more especially still in the upper part of those organs, is extremely prone to end in tubercular deposit in persons who have a consumptive tendency. The local action gives the opportunity and the spot for the display of that fatal tendency, and, therefore, in such persons the existence of this form of inflammation, whether arising of itself or being the remains of an acute attack, is peculiarly fraught with danger; not from the changes which result from inflammation, which would be reparable, but from the deposit of the unorganised material so often rapidly accumulated, and, as far as is known, so extremely seldom removed.

Such a state of things calls for a prompt and decided remedy; and the Dublin physicians have proposed, and, indeed, put in practice, the use of mercury, which has met with marked success, as I can testify from observation. The object is to give it steadily and mildly, so as to affect the system gently.

Caution and discrimination are required, lest in our attempt to subdue the local disease we undermine the general health, and so increase in the system the tendency to the deposition of tubercle, the formation of which the exhibition of mercury is intended to prevent. The extent to which mercury should be given must be left to the practitioner, it being premised that the remedy should not be given with a bold hand. Nevertheless, its effects must be plainly manifested. Already it has been shown that the evil consequences of mercury are in the majority of cases owing to its injudicious use, and not to any absolutely pernicious properties in the agent itself.

The question as to whether or not tubercle arises from inflammatory action is one of much difficulty: for, although inflammation, properly so called, never gives rise to tubercular deposit, it is nevertheless capable of so influencing the affected parts that, after its own action has ceased, they are extremely liable, under certain circumstances, to lapse into the state which developes tubercular formation. So that, though inflammation may precede the occurrence of tubercle, it has no part in the formation; though it may call the diseased process into activity, it has no share in the result. Still, as the presence of inflammation disposes a part to the formation of tubercle and aggravates the mischief when it exists, it some-

times becomes a question whether it is prudent or not to give mercury in cases in which we have any reason to believe that tubercle has been deposited, but around which absolute inflammatory action is going on.

I confess myself favourable to the employment of the mercury, though many regard such practice as highly improper. But when I consider that in these cases the inflammatory action is hastening the destructive process in the lungs, so far as tubercle is concerned, and is disorganising the lungs themselves; and when I add to these considerations the fact of the great good that I have seen such cases derive from such treatment, I cannot withhold my consent, or refuse to have recourse, to it, notwithstanding the grave objections urged against it. I as well know its dangers as its advantages. We must be very cautious. We must so give the mercury that it only just exercises its influence over the system. Under such treatment I have seen many patients raised from a state of great peril to comparative safety; the tubercles remain stationary, the physical signs of pneumonia disappear, considerably more air enter the lungs, and the respiration assume the ordinary murmur. It is not supposed that these cases are cured, but that they are snatched from present danger; and who shall say how long tubercle in the lungs may

remain inactive, provided that we are permitted to stay the disease going on around it?

In the cases spoken of, allusion has been chiefly made to the miliary form of tubercular deposit; but beyond doubt a portion of the lungs may become the seat of tubercular matter which may soften and be expelled, so that a cavity is formed, and yet the patient live on for years in tolerable health. Now, in such instances, pneumonia is apt to occur, and through it the cavity is enlarged. In these cases also, mercury is of service.

The bronchial membrane, and especially in the minuter ramifications, is liable to a peculiar sort of inflammation which, though very chronic, ultimately ends in tubercular deposit, and thus carries off great numbers of old persons. Indeed, it is perhaps hardly sufficiently known that very many old people die of phthisis. A great many of these cases, however, are unfit for mercury, and in none can it be employed when tubercle has been formed. Yet a certain number of the patients present the occasion for its use. They have had cough and wheeziness for years. In the winter this wheeziness is now and then excessive, and, if the chest be examined, the smaller bronchiæ are found to be much affected. Of this perhaps the patients get better, to have another attack, until at last the disease becomes fixed. What they expecto-

rate is a mixture of frothy, glairy, muco-purulent, rusty matter, which becomes more purulent, and finally shows all the characters of the sputum of phthisis.

The above condition I have frequently seen in old persons, and especially some years ago in a particular class of men, old sailors—"Rockingham House men." These old, weather-beaten fellows, after a lengthened service, become paupers, and present themselves in large numbers at the great hospitals, labouring under pulmonary affections; and a great portion of these men are phthisical. Now, in very many of these cases there is a period when mercury, by staying the disease as it is about to advance into the minuter structure of the lungs, in all probability prevents the tubercular deposition.

I am by no means advocating the general use of mercury in such cases, but am merely suggesting the probable termination of the disease and what appears likely to prevent it.

Of course these remarks on the use of mercury under certain circumstances do not apply to the usual treatment of bronchitis in the old, which disease is most benefited by the exhibition of the class of stimulating expectorants to which squill, ammoniacum, and the balsams belong, the use of counter-irritants, and the support of the general powers.

Although mercury has a very marked effect upon the diseases of the *nervous system*, yet it does not require any special notice in this relation. Its employment in these affections demands the same energy and caution, the same steady perseverance as in the diseases of other parts. It would appear, however, that under some circumstances mercury displays a decided influence over this system, as when mercurial tremors, mercurial erythism, &c., occur.

As certain diseases of the *skin* arise after the administration of mercury, we are led to suppose that the remedy has some peculiar effect upon the formative tissue of the part; and this view is supported by the fact of the evident advantage from the use of the remedy in inflammatory affections of the skin, particularly in those of an inveterate kind.

In what has been said, little or no mention has been made of the different preparations of mercury: of their peculiarities and eligibilities. Every practitioner has his preferences, and, provided that he is perfectly master of the preparations he employs, it is better that he should keep to them. It can be but of small consequence which form of the remedy he uses, seeing that, for the most part, they all have the same effect, if given in a manner suitable to achieve what is desired. They are all virulent or all mild according to the mode of using them. The bichloride, though so

poisonous, is by many given to produce the mildest effects. Sometimes its ready solubility gives it great advantage, in many respects, over the other preparations. The chloride is highly valuable. The blue pill and hydrargyrum cum creta are also of great service.

IODINE.

Iodine is one of the most valuable remedies in the materia medica. It is taken into the circulation, as is proved by finding it in the blood, sweat, urine, saliva, and milk. It has a decided effect upon the *formative tissue*, as is shown in the disappearance of tumours under its external or internal use. Indeed it possesses a very notable power of producing absorption in all parts of the body. When used internally it frequently causes considerable irritation of the mucous membrane of the stomach and bowels. To secure its medicinal operation it must be introduced into the system without any such result. Its value lies in its power of influencing the organic energy of the formative tissue.

In many respects it resembles an agent of more acknowledged utility and power—mercury. Like it, in full and repeated doses iodine causes ptyalism, has

a reputation for curing syphilis, most decidedly benefits secondary venereal affections, and has the power of controlling some forms of inflammation.

In saying that the effects of iodine resemble those of mercury, I do not mean to state that it is to be regarded as a substitute for that valuable remedy. Its proper sphere of action is in cases in which mercury is inadmissible, but in which an agent is required that will bring about much the same results in a less active manner. When, in the course of inflammation, normal lymph is effused, iodine is of little service; or, at any rate, is of less service than mercury: but when the lymph effused is of such low vitality that it never becomes properly, if at all, organised, iodine is the remedy. The iodine is useful, not because the body is greatly debilitated, but because there is a peculiar kind of inflammatory action: for in ordinary inflammation in the most debilitated subject, mercury is the agent on which we should rely; in conjunction, however, with support. Therefore we must not be deterred from using mercury because the vital powers are low; for mercury, given with support and stimulants, is the best remedy in inflammatory action so long as that action does not alter in nature (does not differ from ordinary nutrition, except in being excessive) and give rise to inorganisable products.

But inflammation is by no means uniform in its

character or results. It often differs widely from the process of nutrition, and forms products incapable of composing a part of the living body. These differences in the course and consequences of inflammation are induced by the peculiar condition of the patient: either the formative tissue being in such a state that, on receiving an impulse, it passes from a healthy to a depraved action and gives rise to inorganisable products; or the materies morbi, being concealed and circulating in the blood, is attracted and retained as it is passing through the part in which abnormal action exists. In either case the formative tissue takes on a peculiar action and forms a peculiar product. This action, though sometimes quick, is usually slow and very insidious. Its vigour will bear no comparison with that of the action of ordinary inflammation.

There is a form of inflammation very remarkable in its nature, and chiefly characterised by want of progress. The action goes on—if the expression may be used—for days and weeks; the function of the part attacked is more or less interrupted, the whole system is more or less distressed, but the local organic change is trivial. The parts mostly affected are the *fibrous structures* and *the brain*, the centres of that organ especially being diseased in childhood. Indeed, most cases of hydrocephalus and softening of the centres are the result of such action. The extreme

insidiousness of these cases and their long course; the effusion—mostly a little turbid—the slight deposit often seen upon the surface of membrane, and, if there has been occasional exacerbation of symptoms, the deposit of lymph and even pus, softening of the substance of the organ, its infiltration with fluid, sometimes tinged with pus: all prove that a low form of inflammation existed, which, though not sufficient to rouse and excite the system or the organ itself, or to seriously interfere with its functions, was sufficient to slowly change and gradually render it unfit for its important office. In the fibrous structures also, this low type of inflammation may exist for a very long time with little or no change of the parts. Yet the constant pain, aggravated by the same causes as increase pain in known cases of inflammation of these structures, and a slight local change—thickening, and occasional exudation—prove the presence of the diseased action.

Now, in this peculiar form of inflammation, the disease is checked and modified, and, in the case of the fibrous structures in particular, the affected part brought back to its proper state, by iodine. In fact, what mercury is to the higher kinds of inflammation, iodine is to the lower. In the latter, the part is in a feeble, but irritable condition; it attracts to itself the nutritive fluids, but is incapable of raising them into

living solids, and so matters foreign to the system are formed: or if, as is possible, the part does raise the nutritive fluids to living structure, this is of so feeble a nature as to become a vicious product and hurtful to the system. But the solids are frequently just irritable enough to attract the fluids to them, and to do no more; so that constant irritation is kept up, though no product is formed. And these states are precisely the opposites to those in which mercury is useful. In them there is a deficiency of fibrin: the formative powers of the system are below the natural standard. To give mercury in such cases is to aggravate mischief, as experience has amply taught. Even if given with support, it is a bane in such states. The attempt to sustain the system with tonics is attended by no better results. It is too late; the diathesis is formed: and though these means might change it, the time spent in the endeavour would be sufficient to perfect the local mischief. Some agent is required that shall have an action analogous to that of mercury, but somewhat different in kind; that shall affect the formative tissue, and not, as mercury does, lower, but modify its organic energy. This, iodine does: for it has great power over the nutritive function; and, indeed, some object to its use because of this power, by which it produces great absorption and emaciation. Yet the fact also is that the administration of iodine is

frequently followed by the contrary effect, the patient getting fat; which circumstance suggests that the power of the agent cannot be limited to the promotion of absorption. In truth, iodine acts upon the formative tissue and affects its function, not by constantly promoting any one of its operations, but by altogether modifying its action.

In estimating the effects of iodine in tubercular disease we must be careful to distinguish between its action upon the peculiar state of the formative tissue that gives rise to the deposit and its action upon the deposit itself. Over the former, the agent has considerable power; over the latter, comparatively little. Yet, when deposit has taken place, iodine does good by improving the action of the part, and of the system at large.

Iodine has obtained great reputation in bronchocele. There is no doubt of its efficacy; yet it does not appear to have any peculiar operation upon the part, and the probability is, that the notion of its specific effect in these cases has been derived from the circumstance of the disease lying on the surface and the changes in it being, on that account, easily observed. Besides, it is not to be supposed, that any agent can be invariably successful in all cases of morbid increase of a given organ; and as goitre arises from a variety of diseased products—the results perhaps of active inflammation, or of some malignant

process—we ought not to look to iodine for unfailing relief. But its employment is highly beneficial when there is neither active inflammation nor great hardness; in short, when the organ has merely undergone enlargement from morbid nutrition.

Iodine is of great service in diseases of the *skin*, especially when they are tainted with scrofula or syphilis.

In induration, or affection in general, of *fibrous structures*, particularly when of syphilitic character, iodine is of great value. A curious instance of its unusually rapid efficacy I once saw in a medical man, who was suffering under periosteal affection. In him a moderate dose removed severe pain in half-an-hour, not once only, but so often that he invariably had recourse to the remedy, with invariably the same result.

The iodide of potassium seems to be the most convenient and efficient preparation of iodine.

ANTIMONY.

Antimony is a very valuable remedy, chiefly useful when the system is under considerable vascular excitement. Its effects quickly appear, are great in

degree, and various in kind. A large dose may very soon be followed by nausea, vomiting, lassitude, depression of the nervous system, relaxation of the muscles, a feeling of great feebleness and exhaustion, looseness of bowels, sweating, convulsion, delirium, and even death. The effects of smaller doses are for the most part the same in kind, but very much less in degree: general depression, diminution of the heart's action, increased secretion, and a marked operation upon the condition of particular organs.

Thus antimony has an extensive action. Its beneficial effects can hardly be said to arise from its power of depressing the action of the heart and arteries, from its influence over the brain, or from any revulsive or depletive operation that it may exercise by increasing secretion from the mucous membranes. Even in inflammatory disease, the mere lowering of the heart's action would only diminish the quantity and force of the blood sent to the part; and though it might check the disease, a form of inflammation less active, but equally indisposed to end in resolution, would still run on. As to the brain, there is no evidence that the remedy has sufficient action upon that organ to account for its general effect in disease. As regards its derivative or depletive operation, there is abundant evidence that its most beneficial effects are obtained without any such actions.

Indeed, Laennec observes, "that in general its effects are never more rapid or energetic than when it produces no kind of evacuation." The testimony of others is the same; to which I may add my own. It cannot be doubted, however, that under peculiar circumstances the occurrence of evacuations is frequently followed by a good result. But it is not by such means that antimony produces its proper effect.

Although there is no doubt that antimony enters the *blood*, yet we have no proof that it influences the vital changes which occur in that fluid. It seems, however, fair to assume that an agent undeniably possessing great power over the vital operations must affect those operations in the blood as well as in the solids of the body.

Antimony has a decided action upon the *formative tissue*. Its application causes a distinct local affection. When it is applied to the skin, a peculiar eruption follows; and, under its internal use, the same eruption is said to occur in the mouth and intestinal canal. This cannot proceed from mere irritation; for no other irritation produces the same eruption, and from antimony the eruption is always the same. Though antimony especially affects particular organs, its operation is felt throughout the

system, and every part of the formative tissue is more or less influenced by it.

As with some other remedies, the presence of certain disease, or rather, of certain states of the system —inflammatory, for example—enables the patient to bear large doses of this agent. This tolerance is very remarkable, and some authors broadly assert that the proper antiphlogistic effects of antimony are not obtained unless such tolerance exists. This assertion is to some extent true: for, as in the case of mercury, a certain quantity of antimony must be present in the system (which cannot happen if the remedy disagrees) before the organic energy of the diseased tissue can be modified and the peculiar power of the agent be manifested. As said before, the efficacy of antimony does not arise from an evacuation of any sort. Indeed, in many cases in which the remedy is most serviceable no apparent effect whatever is produced, except the steady subsidence of the disease. Now, if the remedy has a notable effect upon the disease, though neither evacuation, nor revulsive action, nor anything of the kind occurs, we may infer that, like most other medicines, it acts upon the formative tissue of the part diseased.

We must, therefore, suppose that it enters the circulation, takes the course of the blood, and on

arriving at the part affected, there spends its power in direct action upon the formative tissue, influencing in some way its organic energy, and restoring it to a state of health.

An agent having such power as antimony would be expected to produce many observable effects upon the body; and so it does, as will be presently shown. The dose has a very distinct influence over the character of these effects. If the quantity given is small, secretion and exhalation in general are increased—of the skin, mucous membrane, and solid glandular organs. Under these circumstances, it would appear that the remedy rapidly leaves the body, and that the beneficial results are consequent on its exit; the tendency being to relieve febrile excitement. In somewhat larger doses, antimony excites nausea, and perhaps vomiting, uneasy sensations about the stomach and abdomen generally, with looseness of bowels. All this is accompanied by more or less depression, feebleness, and exhaustion. The secretions in general are much increased, the skin often bathed in sweat. But the more valuable and peculiar powers of antimony are seen only when large doses are given. In this respect it much resembles mercury, which, before the system is saturated, causes a variety of changes in the vital acts of the different organs; which changes, when the system is saturated, are

either not produced, or are obscured by the very different and (in relation to disease) far more important effects then brought about by the remedy. The smaller doses act upon the healthy functions of the body, and modify them, leaving the disease to run its course: the larger, as it were, leave the ordinary functions of the system untouched, and spend their strength upon the part diseased. So also is it with antimony. The smaller doses operate upon and variously modify the healthy action of organs, and have little or no effect upon local disease: whereas the larger doses show but small effects upon the general functions of the body, and seem to spend their force upon the affected part.

Whatever reputation mercury has gained for acting in a distinct manner upon particular organs, antimony has, with equal reason, obtained as great. When it is given in full doses, its effects are quickly manifest; and from this rapidity of action it is in some respects a more valuable remedy than mercury itself in inflammation of certain organs. Though the effect of antimony in inflammation is similar to that of mercury, still it is probable that the mode of operation of the two is not the same. Antimony has not the varied range of operations that pertains to mercury. Its action is more rapid, but less permanent, than that of mercury. It relieves the disease

more quickly than mercury, though it is less useful in removing the changes consequent thereupon: but it does not lead to the evils so often the result of the free use of mercurial agents.

The *stomach* seems to be the organ most readily affected by antimony. If its administration is followed by vomiting which obstinately persists, the remedy evidently disagrees. But it is remarkable that such an effect is quite exceptional, the fact being that the tolerance of the patient increases with the quantity of the remedy given; so that very large doses, which at first would have caused alarming symptoms, are often ultimately employed with no other appreciable effect than relief to the disease. Like as antimony acts upon the stomach, so does it upon the *bowels:* and it is probable that the altered secretion in both cases arises from the direct action of the agent upon the formative tissue, with which the alimentary canal is so richly endowed. It does not appear that antimony is of any service in the acute diseases of these parts: on the contrary, it seems to irritate. In their chronic diseases, however, its use is beneficial, and of much more extensive application than is generally supposed, both in assisting the operations of other medicines—purgatives, for example—and in producing a direct and salutary effect upon the formative tissue of these parts. In

certain states of the system—febrile, for instance—antimonials are of great service, not only by moistening the skin, but by also slightly increasing and improving the intestinal secretion, and thus clearing away the tenacious mucus often formed in that condition of disease and restoring the clean villous surface.

But the influence of antimony is most generally acknowledged in inflammation of the *lungs*. In that disease the good effects of the remedy show themselves with extraordinary rapidity and power. Indeed, its rapidity of action is its chief advantage, and gives it precedence of every other remedy in that affection. But though it undoubtedly has the power of checking the disease and bringing about reparation, this power is most apparent in the earlier stages of the affection, when consolidation is only in progress: for when consolidation has fully occurred, antimony is seldom able to remove it. Indeed we may say that antimony is effective by rapidly checking inflammation and quickly removing its recent products; and that mercury more slowly checks the disease, but more surely repairs injury, whether recent or of long date: that antimony stays changes while they are proceeding, and removes products before organisation has occurred; but that mercury checks and restores in every stage of the diseased process.

In pneumonia, then, antimony is singularly useful by the rapidity of its effects. In that disease the changes often run quickly through their course, and it is essential to have a remedy equally active. Antimony is just the remedy required. Bloodletting being left out of consideration, it may be said, that in the knowledge of the comparative value of antimony and mercury in the treatment of pneumonia lies the secret of success. If mercury alone is used, much time is lost. The disease is exceedingly active, and the remedy must be prompt. This, mercury is not, but antimony is. Besides, antimony does not so often disagree as mercury does, when rapidly and largely given. It repeatedly happens that mercury runs off by the bowels, and then not only does not exercise any specific influence over the disease, but, by disordering the intestines, adds to it another element of distress and exhaustion: whereas antimony, if it does disagree by disturbing the bowels, produces a much less severe effect, and one which soon ceases.

Antimony, however, is not only very valuable in pneumonia, but extremely useful in bronchitis; in the acute form of which, especially when the vascular excitement is great, full doses of the remedy soon procure relief, and now and then speedily sweep away the disease—sometimes inducing profuse expectoration, sometimes having no such effect. In bronchitis

of an acute character in a feeble patient, antimony is also very useful: but in such cases it must be combined with other remedies and with support.

In the form of bronchitis which mainly affects, if it is not confined to, the smaller tubes, antimony is likewise of essential service. Indeed, the anatomical character, and consequently the physical signs, of this kind of bronchitis closely resemble those of some forms of pneumonia. But the system is not excited, as it is in pneumonia. On the contrary, the powers of life are, generally speaking, depressed: so that, though the part affected needs the action of antimony, the remedy cannot be safely given unless in conjunction with support, and even stimulants. Thus seconded, its use is followed by the best results; yet, not invariably: for antimony has not the same power over this disease that it has over inflammation of the substance of the lungs.

Mention has already been made of the effect of antimony upon the glands of the gastro-intestinal canal, as evinced by increased secretion from the mucous membrane. Over the *pancreas* and *liver*, the remedy has a like influence. Its action upon the *skin* is well known; as is its power of bringing the *kidneys* into increased activity, especially when the skin is kept cool. From these effects, or rather from the peculiar operation upon the body which

produces these results, antimony has obtained the reputation for cooling and antiphlogistic properties which it so well deserves. It appears to operate, not by constricting or otherwise primarily affecting the vessels, but by influencing them secondarily through its direct action upon the formative tissue, to which they minister. In exercising its power over the heart, and so lessening the impulse, antimony necessarily affects the whole vascular system, and, consequently, the capillaries of the glands; the result being that the blood circulates through them less abundantly and forcibly than before. For like as this remedy acts upon the formative tissue of the body generally, so it acts upon that of the heart, and, in consequence, modifies the function of that organ; and, further, it doubtless also acts in a similar manner upon the walls of the vascular system: so that by its secondary operation upon the heart and vessels, in conjunction with its influence over the formative tissue of the glands (the chief cause), it brings about in those secretory or excretory organs its salutary effect.

Upon the *circulatory system*, antimony acts in a striking manner. It is the most powerful remedy we can give to allay inordinate vascular excitement accompanied by want of real power. In such a condition, however, the nervous function has a prominent

share; and of this combination, notice will presently be taken. But in purely vascular excitement, antimony is the remedy. Some febrile states seem to depend chiefly, if not entirely, upon increased force and frequency of the heart's action and too great tonicity of the vessels. This state of the heart's action and of the vessels may continue for some length of time with little disturbance of other parts of the system, except trifling derangement of the glandular organs. There is slight fever, and that is all. We cannot fix upon any particular organ and say it is diseased, or even seriously deranged. To what extent, in these states, the blood may be poisoned, and to what extent antimony may assist in its depuration, are questions not easily solved: but it must be admitted that in such states this remedy is remarkably useful. Under its influence, the frequency and force of the heart's action diminish, the pulse loses its morbid firmness, the arteries their excitement. It is true that these changes are often accompanied by increased secretion and a relaxation of the whole frame, which must of necessity considerably reduce the energy of the circulatory system: yet this increased secretion, &c., often occur from other causes, without the same beneficial results. But though it is difficult to distinguish the particular actions of a remedy so complicated in its effects as antimony,

there is conclusive evidence that it has a decided influence over the heart and arteries.

The intimate relation that exists between the vascular and *nervous systems* renders it difficult to discover upon which of the two some remedies act: for if the balance be upset on either side—if the supply of blood or of nervous energy be altered,—disturbance of both these systems is the consequence; that of the nervous, however, being the more distinctly shown. Indeed, when we consider the anatomical relation of these two systems and their dependence upon each other, it is little surprising that we cannot easily separate the particular effect upon either of a remedy which acts upon both. In making these remarks, I refer to the nervous centres merely; the connexion of these systems elsewhere being less intimate, or, rather, the effect of a given remedy upon them being more easily analysed when other parts are affected than when the centres are involved.

But though difficulty exists, it is by no means impossible to clearly perceive the operation of antimony upon the nervous system. The great depression of the muscular power, the deadly nausea and faintness, and in extreme cases (poisoning), the cramps, convulsions, delirium, insensibility, which may follow the taking of antimony, all demonstrate that the nervous system is deeply affected by it. In

certain states of that system, and especially of the brain, it is a most valuable remedy. Its great value is evinced in cases in which there is much nervous excitement, sleeplessness, delirium, rapid pulse, but considerable depression of the vital powers withal; as muscular tremor, brown and dry tongue, and feebleness of pulse, denote. In such cases, in which there is much excitement, but not the excitement of power, the calm that succeeds the use of antimony is very marked.

It will therefore be allowed that antimony, which evidently has a direct effect upon the vascular, has also a direct, though perhaps less powerful, effect upon the nervous system. This opinion is strengthened by the fact that, in the excited condition without power just mentioned, though opium seems to be the remedy strongly indicated, yet it is not, in most cases, borne. The calm and sleep expected from it do not ensue. But when it is given, even in small doses, in conjunction with antimony, tranquillity and sleep soon follow. The antimony lessens the irritability of the brain, calms its excessive action, and brings it into a state favourable to the agency of the opium. For opium is not a remedy when the brain is under vigorous excitement, but when it is under excitement consequent upon exhaustion.

The combination of antimony with opium, then,

forms one of our most valuable remedies in some conditions of the nervous system that occur in certain stages of fevers or other protracted diseases, and that are present in some forms of dilirium tremens, to which the above-mentioned stages of disease are closely allied.

In another large class of diseases, of which the state of system arising from a punctured wound in dissection is a striking example, the most prominent symptoms are referrible to the nervous system: yet the excitement of the circulatory system is extreme, and the two go on in a hurried course until life is extinguished. Now, in such a case something is needed which shall calm, but not embarrass; which shall allay the excitement, but not depress the vital powers so low that they fail to rally. And this, antimony can effect: for, however much it may diminish inordinate action, it does not readily extinguish life by fatally depressing its powers. On the contrary, though the system is fairly under its influence, the patient (unless he suffers nausea, which is another matter) will express himself as relieved from a load that had oppressed him. This is often seen when great debility has preceded the exhibition of the remedy. To produce these effects, the antimony must be given frequently and in full dose, so that its operation may be sustained.

With regard to the enormous doses sometimes given, especially by continental physicians, I have no experience; from four to six grains of emetic tartar in the twenty-four hours having been found by me to be a quantity quite large enough to produce all desirable results.

Antimony has been recommended in acute rheumatism. I have found it useful in a particular form of the affection, chiefly distinguished by great vascular excitement without any disease of the heart, and in which the pain appears to be mainly owing to the great injecting force of the circulatory system.

Emetic tartar is perhaps the only form of antimony that we need employ.

ARSENIC.

Arsenic acts upon the *formative tissue*, through the vascular system. This is proved by its action being quick in proportion to the absorbing power of the part to which it is applied, by its most soluble preparations being the most energetic, and by its occasional presence in the various organs, structures, and secretions. This is further supported by the fact, that when used externally it destroys the vitality of the

parts touched, without producing any known chemical change. It is absorbed by the broken, and even by the sound, skin. When given to animals in full or poisonous doses, its first obvious effect is irritation of the alimentary canal. This, however, is an effect common to almost all powerful medicines. When arsenic has entered the system, its influence over organic life soon appears. If it is given in doses beyond those which are strictly medicinal, it acts as a slow poison, and gradually reduces the vital powers. The strength fails, the appetite declines, aversion to food succeeds, the pleasures of life are no more, the sufferer becomes indescribably listless, and sinks unconcernedly into the grave.

An agent of such power has naturally enough attracted the attention of physicians, and its potency has led them to turn its great influence to advantage in the treatment of disease, with a success which experience has abundantly confirmed. Notwithstanding the strong prejudice of many practitioners against it, arsenic has maintained its ground as a remedy for various diseases. Its disrepute has arisen from its abuse. If properly given, it is as manageable and safe as any other powerful agent. To make it safe, the dose must be small, so small that the stomach can in no way suffer. If there be dryness and tightness in the throat, or dryness in the mouth, or if there be

salivation, we may be sure that we are giving too much. These are its poisonous effects.

Acting as it does upon the formative tissue, arsenic spends much of its power upon the secretory organs—the alimentary canal, skin, salivary glands, kidneys, lungs. I am not aware that it has been used for the relief of any disease of the *alimentary canal.* Its efficacy in affections of the *skin*—particularly in those of a scaly character—is very remarkable. Increased flow of urine and occasional salivation lead us to suppose that arsenic influences the *kidneys* and *salivary glands.*

The appearance of redness on the internal surface, and of red spots in the substance, of the *heart*, when considered in connexion with distress in the region of that organ and quick, irregular pulse, brings us to the conclusion that arsenic has no inconsiderable effect upon that important viscus.

The occasional occurrence, during the exhibition of arsenic, of headache, giddiness, delirium, coma, feebleness, tremor of limbs, imperfect palsy, paralysis, epilepsy, tetanus, fatuity, sometimes severally, sometimes variously combined, appears to show that this agent has an effect upon the *nervous system.*

The efficacy of arsenic in intermittent fevers and other intermittent diseases is universally admitted. Whatever may be the intimate nature of these dis-

eases, they appear to be influenced by remedies through the nervous system. And this is not surprising when we consider that some of them are distinctly seated in the nerves themselves — periodic neuralgia, for example. Now, the seat of these periodic diseases in the nerves, and their cure by arsenic; the close analogy of intermittent fever to them, and its cure by arsenic also; the marked effect of this remedy upon the nervous system at large; all tend to prove that the way to treat these affections lies through the nervous system. Indeed, all reputed remedies for these diseases seem to act upon it. Generally speaking, arsenic is inferior to quinine in intermittent fever, though it will sometimes cure when quinine fails. In intermittent affections of the nerves, perhaps arsenic is quite as useful as, if not more useful than, quinine. But in these cases also the one may succeed when the other has failed; which circumstance seems to imply that in these diseases there is not always precisely the same pathological state.

The mode of exhibition of arsenic differs from that of quinine. Arsenic is given in continuous doses, without reference to the recurrence of attack; whereas quinine is given with most advantage in a full dose before the expected paroxysm. Arsenic has not been found to possess the power of at once preventing the fit, or of cutting short its course. Arsenic may be

employed though there be an inflammatory condition of system, and in this respect may have advantage over quinine. Arsenic has been of service in chorea, and is said to have cured intermittent vomiting.

When continued in medicinal doses, arsenic usually produces redness and pricking in the *tarsi* and a disposition in the *conjunctiva* to be inflamed. These intimate that the system is saturated with arsenic, just as ptyalism hints that it is fully charged with mercury. In both cases we are warned to decrease the dose.

Arsenic should never be given on an empty stomach. The solution of the arsenite of potash is, I believe, the only form in which arsenic is administered.

IRON.

Iron is not only potent in the cure of disease, but its presence in the blood is necessary to health, if not to life. Many of the diseases in which it is chiefly useful are essentially connected with its abstraction from the body. Under this deprivation the powers of life are much lowered; there is diminution of some functions, as the uterine; painful performance of others, as of the heart; derangement of all. The surface is pallid. When this condition, somewhat loosely

called anæmia, is fully developed, the vital powers are at a low ebb ; the circulation is so languid that serous effusion occurs over the greater part of the surface, and in many of the cavities ; the digestion is so impaired that but little food, and that of the simplest kind, can be taken. When the disease has advanced so far, it is usually fatal ; the powers of life are too low to rally. But there are states similar to this, though much less extreme, which may exist for a long time—for years : as seen in girls, for example. It might be expected that such a condition of the system would lay the foundation for and produce serious or fatal consequences ; such as phthisis, scrofula, malignant disease. Yet experience teaches us that this is not the fact. It is not meant to be said that these diseases never occur in such a state of system, but that they do not occur sufficiently often to cause us to infer that anæmia tends to produce phthisis and the rest.

In this state of pallor and apparent bloodlessness associated with functional derangements merely, iron, then, is of exceedingly great service. But it is by no means efficacious only in such a disturbance of the health. It seems to enrich the blood, and to stimulate the organic energy, not simply by affecting the blood, but by coming into contact with, and acting upon, the formative tissue : for many of its effects are

too rapidly produced (as in chorea and neuralgia) to be referrible to mere improved condition of the blood and consequent improvement of the system, even if we admit that any degree of improvement in the tone of the system can cause such effects.

As said, the presence of iron in the *blood* seems to be necessary to the proper performance of the vital functions. How its agency is exerted we know not, but the necessity of its presence is on all hands allowed. But as the presence of iron reddens, invigorates, enriches, and its absence renders pale, depresses, impoverishes, the blood, we may fairly conclude that the agent is intimately connected with, and in some way ministers to, the vital endowments of that fluid, and that its actual quantity is mainly of importance in reference to these circumstances. When it is in very diminished quantity, weakness and sinking of the vital powers may be induced, even to a degree to cause death. When it is in great abundance, plethora may be the consequence, to a degree to imperil life. In anæmia, its effects are plainly and indisputably seen. Under its use, the pallor lessens, the morbid consequences of impoverished blood—as short breath, throbbing in the head and other parts—diminish, the impaired digestion improves, the bodily vigour returns, the catamenia reappear. The blood, which was so pale as scarcely to stain a white hand-

kerchief, regains its colour; the restoration of health advancing in proportion as this improvement of colour proceeds.

The good effects of iron are direct, and arise when it is given alone. They seem to result simply from the recovery, by the system, of iron which had been somehow lost. The operation of the remedy is comparatively slow. It enters the circulation, a part of it unites with the blood, and probably a part of it is cast from the circulation as useless. A large portion of it passes through the alimentary canal unabsorbed. From this last circumstance many have inferred that iron ought to be given in small doses only, and especially because even then a portion is thrown out of the system. Experience, however, teaches us that the patient seldom suffers inconvenience from full doses, and recovers more quickly than if small ones are employed: for with iron, as with many other remedies, saturation of the system must be attained before the efficacy of the remedy can be fully felt and seen.

That, as noticed above, the iron enters into vital combination with the blood is countenanced by the fact that its beneficial effects are more quickly apparent if it be given soon after the taking of food. That this remedy adds to the vigour of the blood seems clear. It not merely supplies any deficiency of its own quantity that may have occurred in the blood,

but is a powerful means of opposing those agents which by their direct influence diminish the vitality of that fluid. For example: many morbid materials—as pus and decomposed animal matter—circulate in the blood and have a decided effect upon it, rapidly blanching and otherwise injuriously affecting it. Now, in such cases, iron is very beneficial; probably by raising the vitality of the blood, and thus enabling that fluid both to resist the depressing effects of the poison, and to act upon the morbid materials themselves and render them innocuous. In these instances, however, the iron must not be given at the outset: for when fever and constitutional irritation run high, other remedies are more appropriate. But when the first effects upon the system have ceased, when the patient becomes blanched, the vital power impaired, and hectic appears, iron is very valuable. Yet, as its operation is comparatively slow, other means must be simultaneously employed; or, while its curative action is in progress, the patient may die from exhaustion.

In hastening recovery from the various fevers, iron is very useful. In these diseases the blood is rapidly impoverished, and though recovery is for the most part tolerably quick, it is sometimes protracted, tedious, and even attended with danger. Then it is that iron is of much service.

In whatever way iron affects the blood, the action

is essentially vital. Now, as the vitality of the blood is the same in nature as that of the solids, and as the iron is carried by the blood into contact with the solids, we may fairly suppose that it acts directly upon the *formative tissue.* There is no question, however, that the iron may by merely improving the blood operate very beneficially upon the formative tissue, and that this agency may be easily confounded with the direct action of the iron upon that tissue. But though this difficulty exists, it must be admitted that the iron does act directly upon the formative tissue; affecting that tissue, probably, in a manner the same as that in which it acts upon the blood-corpuscles; the result being, that the circulation becomes less languid, the supply quicker, the elaboration more active, the product more highly vitalised, and that, in consequence, the flagging organs improve in function, the powers of life are restored, and ultimately the whole body resumes the condition of health.

The rapid action of iron in certain diseases of the *nervous system* shows its power over that part of the frame. In chorea, in some forms of neuralgia, in tetanus, and in asthma, it has been found very advantageous. In these cases it appears to act upon the nervous system itself. Its effects are too quick to be due to an improved condition of the blood, or

of the body in general, consequent upon the restitution of the natural and essential quantity of iron which had been in some way lost. In diseases characterised by paroxysms, as ague, tic douloureux, iron is of service.

In certain conditions of the *heart* also, iron is useful. In some, as when the organ is flabby and weak, it seems to act upon the muscular structure of the part in common with that of the rest of the body, and so to improve the tone; but in others, as angina pectoris, its influence over the heart in particular is very marked. Yet in these cases it is by no means clear whether it acts upon the nerves distributed to, or upon the muscular structure of, that organ. But that it has a beneficial effect upon the permanently diseased heart—especially if the organ is also flabby—experience has proved. In these instances, the potassio-tartrate is valuable, not only because it is a good form of iron, but because it greatly relieves some of the complications frequently met with in disease of the heart—as dropsy—by acting upon the kidneys and bowels. It should, however, be given in a full dose.

In anæmia and protracted exhausting diseases, and, indeed, in debility generally, there is almost, if not quite, always pain at the heart. Under such states of system the muscles are enfeebled, and incapable of carrying on their action with proper vigour.

The heart participates in this want of tone and power; but as its action is necessary to the life of the individual, it must, so to speak, exercise its function whether it will or not. It is urged to do more than its strength can properly allow, becomes irritable, fatigued, exhausted, and is therefore the seat of pain. In these cases, iron is invaluable.

Though the several preparations of iron produce the same principal effects, they do not cause the same results in some minor points. Of all the forms of this agent perhaps the most useful and active is the sulphate. More than any other preparation it seems to check the secretion of the gastric and intestinal surfaces, and so to induce constipation. But this effect is not constant. Indeed, the sulphate sometimes purges slightly. It occasionally causes headache, though seldom if the bowels are kept regularly open. If there is a tendency to constipation, the sulphate may be advantageously given in solution with small doses of epsom salts. Indeed, the operation of iron upon the system, particularly in cases of anæmia, is promoted by a rather loose state of bowels. The ammonio-tartrate is very soluble and has but little taste. It slightly stimulates. The sesqui-oxide seems to affect the nervous system more than does any other preparation. It has been found to be of great value in tic douloureux; yet it is perhaps more serviceable in

neuralgia from cold than in "tic," properly so called. Dr. Elliotson has given it with success in tetanus and paralysis agitans. From ample experience I am satisfied that it is the most valuable remedy we have in chorea. It is also of service in true asthma and in angina pectoris. During the whole course of its administration great care should be taken that it does not accumulate in the bowels. It is best given in some confection. The tincture of the sesqui-chloride is a useful form which seems to have some peculiar properties in reference to the urinary organs. In scrofulous children it is a convenient and excellent remedy. The iodide is chiefly of use in cases in which iodine would be beneficial, so far as the local disease is concerned, but in which the system requires the tonic effect of iron. This preparation is highly serviceable in scrofulous children. In secondary syphilis, especially when there is a scrofulous taint, it is one of the most valuable remedies we have. The compound mixture is a very useful preparation, and remarkably serviceable in some forms of disordered mucous membrane of the bowels.

COLCHICUM.

Colchicum acts mainly upon the *formative tissue*, through the vascular system. When taken in poisonous doses, it does not produce a direct effect upon the nervous system: at least, the disturbances which occur—such as weakness of limbs, temporary loss of sight, slowness and feebleness of pulse—may be fairly attributed to an indirect affection of that system, in consequence of the great disturbance of the body in general: and this appears the more probable when we remember that convulsions and, generally speaking, insensibility do not occur.

In medicinal, and also in poisonous doses, colchicum has a decided effect upon the secretory organs, particularly upon the *alimentary* canal. As regards the stomach and bowels, it may perhaps be said that this effect results from direct action of the agent upon the parts. But this is not entirely the case. The common consequence of the administration of colchicum is derangement of stomach, and doubtless its prolonged use often produces confirmed dyspepsia, if not organic change. But its most remarkable and best known effects are upon the intestinal surface, from which a full dose causes large watery evacuations, often attended by much pain.

Many practitioners are of opinion that the efficacy of colchicum in rheumatism is dependent on the agent's purgative effect. This notion is not quite correct. Though in many cases of acute rheumatism relief does not happen until purging has occurred, yet the cases in which small doses of colchicum relieve without purging are too numerous to allow us to doubt that the agent acts upon the system in a peculiar manner; probably, however, causing the elimination of morbid matter by the bowels, not after the depressing and active mode of drastic purgatives, but by so influencing the formative tissue of the bowels that the diseased matter is thrown off. But whether the disease be relieved by the purgative effect of the remedy, or by its quiet operation, the colchicum is remedial by acting upon the formative tissue of the bowels and exciting in an eminent degree their excretory function. The peculiar appearance of the intestinal discharge in the majority of rheumatic cases that are ultimately benefited by colchicum favours this view. The evacuations are dark and very offensive, and are generally followed by relief, if not by cessation of the disease. As a general rule, so long as these evacuations are passed the rheumatism is not cured. There is certainly a close connexion between them. The same remark applies to gout: and the difficulty of explaining the operation of colchicum in

the two diseases—in many respects so dissimilar—is almost removed when we consider, that they both depend on materies morbi which circulate in the blood, that in all probability the intestinal surface is the seat of its elimination in both instances, and that colchicum acts upon that surface and highly excites its secretory function.

Several diseases, or rather ailments, of an anomalous kind, and supposed to be connected with a morbid state of the blood (a materies morbi circulating in it), are much benefited by colchicum, even in small doses, combined with some purgative or alone. Such are erratic pains apparently not properly of a rheumatic nature; slight febrile excitement accompanied by turbid urine, and usually ascribed by the patient to having taken cold; some diseases of the skin of an irregular character, and even the latter stages of the eruptive fevers. In short, whenever we have reason to believe that a morbid poison is in the blood, especially if the evacuations are dark and unusually offensive, small doses of colchicum will be of great service. The proper channel for the exclusion of the poisonous matter from the system is the bowels, more particularly the large intestine, upon the glandular structure of which colchicum chiefly acts. But though the removal of the dark and offensive evacuations—and with them the morbid poison in the blood—by the

bowels is of great service, yet we must remember that the cause of the diseased product lies deep, and that in promoting the elimination of this product we are only removing the matter already in existence while its renewed formation may be proceeding within the system. It is probable, however, that colchicum may so act upon the formative tissue of the body at large as to prevent the formation of the matter; and this, too, without any other manifestation of effect than the recovery of the patient.

Now, although colchicum, like all agents which act upon the formative tissue, affects the body universally, it yet, also like them, mainly operates upon the parts in which that tissue most abounds. Hence its effect upon the glands of the intestinal canal just noticed, and upon glandular organs in general.

Its action upon the *liver* is very considerable, and productive of remarkably good results. When we reflect upon the size of this organ, upon the fact that all the blood from the intestines—blood loaded with nutriment—is brought to it, and upon the amount of secretion which it pours into the bowels, we must be struck with its importance. To have an abundant secretion of bile has always been a great object with practical men. The bad consequences from deficient secretion of that fluid, and, moreover, the common sense notion that so important a function ought to

be in order, have kept attention alive on the subject. The liver has a double office in the economy. It excretes matters that are to be thrown out of the system, and, in all probability, it elaborates from the blood, rich with fresh materials, a matter which forms a part of the bile, and is poured into the intestine in order to be absorbed together with the chyle, of which it in fact constitutes an important portion. If the bile were entirely excrementitious, it would not be poured into the very uppermost part of the intestines, but into the lowest. Again, the fact that a large portion of the nutriment which enters the body passes into the liver leads us to infer that some process like purification is the object of the arrangement; and that, in consequence, vitiations arising from imprudence in diet and faulty digestion are here, in some measure, corrected, and hurtful matters thence derived cast from the portal blood, and so prevented from entering into the general circulation. But to return: the action of colchicum upon the secretory function of the liver is undoubted; though the increase or modification of secretion which the remedy produces will vary in degree and kind according to the condition of the organ and the state of the secretion itself. When the liver is gorged, the secretion is largely increased; when the secretion is deficient, it is rendered abundant; when it is alto-

gether morbid, it is rapidly restored to the quality of health. For such is the preservative tendency of nature, that when a part is under diseased action—unless the action is specific, and sometimes even then—a salutary impression made upon its vital properties quickly induces in it an advance towards recovery, a reparation of mischief, and ultimately a re-establishment of normal function.

In conclusion: colchicum seems to be the remedy when the system has a gouty or rheumatic diathesis; and it appears to relieve by removing the morbid matter from the system, chiefly by the intestinal canal, but also by the liver and kidneys.

OPIUM.

In consequence of the nervous system being the part upon which the more notable action of opium is displayed, an opinion has arisen, and is commonly entertained, that the operation of this agent is limited to that system and is useful in its diseases only. But there is no doubt that opium possesses power over the whole economy, irrespective of the nervous system. In proof of this may be adduced the fact that it produces a manifest alteration in the vital actions of

animals which have little or no nervous system. On being applied to them it causes general depression, sinking, death. A nervous system, then, is not necessary to the display of the power of opium, and we may therefore assume that the action of this agent is not entirely spent upon that system even in animals which have a complicated nervous organisation. Nevertheless, it must be allowed that the action of opium upon the nervous system in animals of the highest order, and especially in man, is so distinct as to throw into the shade its more general operation, and to constitute its chief value in the treatment and cure of disease. Its action is not limited to the production of sleep or the lulling of pain. Its sphere is perhaps wider than that of any other remedial agent. Its effects depend much upon the dose, the state of the system, and the peculiarity of the patient; as indeed is the case with every other remedy. When the body is sound, the action of moderate doses of opium upon the nervous system is clearly seen: but in some acute diseases not of the nervous system itself, the effects of the agent are greatly modified. Doses which in health would cause alarming symptoms then merely bring relief and calm. Again, in some affections in which the nervous system itself is involved—as excessive pain, spasm, &c.—very large doses of opium may be given without any

other effects than relief and tranquillity. No sleep, no constipation, no unpleasant consequence of any sort occurs until suffering subsides, when—the opium being no longer necessary—drowsiness, constipation, &c. are induced.

In the present state of our knowledge it is impossible to determine what the exact nature of the action of opium is, so far as the *nervous system* is concerned. But for practical purposes it is sufficient to know that the functions of this system are especially and obviously influenced by opium, and that, as this system is able to influence every function of the body and by a common sympathy binds and connects the distant parts together and thus forms an united whole, so will the operation of this potent agent be felt wherever nerves are distributed, and through them will it modify the vital acts of every part of the frame. And as the vascular system is the channel by which certain remedies are themselves conveyed to and brought to bear upon the inmost parts, so likewise is the nervous system a channel by which the effects of certain other remedies (opium being one) are conveyed to every portion of the formative tissue—not by the transmission of the remedies themselves, but of the results of their operation upon the nervous centres. But though the chief action of certain remedies is brought about by

their transmission through the sanguiferous system to the nervous centres enabling them to influence the nervous function at its source; a part of the action must, nevertheless, be ascribed to the contact which necessarily exists between the remedy and nervous matter whenever blood so charged comes into close proximity to nerve.

So that, in speaking of the operation of opium—and probably of the whole class to which it belongs—upon the nervous system, we must say, that the remedy acts upon the nervous matter and influences its functions whenever contact is obtained: but with the difference, that when the remedy reaches the centres, its action is general and upon every part to which the influence of the centres extends; that when it operates by contact with the nerves and ganglia, its action is local only and goes not beyond the parts to which the influence of the nerves or ganglia affected extends.

There is perhaps no disease of the nervous system in which opium has obtained so great and deserved a reputation as in delirium tremens. When the nervous exceeds the vascular excitement in that disease, it may be regarded as an unfailing remedy. But though this condition is highly favourable to the success of the agent, it is not essential thereto: for in cases in which the vascular excitement is so great

and the general tone of the system is so high that considerable abstraction of blood is required and well borne, opium is imperatively called for. Nor is the combination of means apparently so opposed in their action really inconsistent: for irritation, vascular excitement, and even inflammatory action, may exist within the head at the same time, and severally require appropriate treatment. Under such circumstances, the most efficient remedies are local depletion, cold applications, and opium. In ordinary cases of delirium tremens, small and repeated doses of opium are sufficient. In severe cases, larger doses must be given until sleep is induced; for sleep is absolutely necessary to success. It is essential that the remedy should be given at intervals of three or four hours; as a quick repetition is liable to be followed by fatal effects, which have been known to occur in consequence of a single repetition of the original dose after sleep had been obtained. It is never safe to commence the treatment with a very large dose.

Although delirium tremens occasionally occurs in those who have much bodily vigour, yet this is quite the exception. In the majority of cases the system is greatly exhausted and needs support and stimulants. Wine and brandy in small quantities repeated are necessary, and to them must be added light and

nourishing diet, especially after sleep has been procured. As a general rule, the quantity and quality of nourishment that should be given depend on the state of the digestive organs. If these are sound, the necessary support is well borne; if they are not, then remedies must be employed to enable them to bear the nourishment of which the system at large has much need. Whatever may be the action of spirituous liquors upon the brain, and whatever may be their mode of benefiting the condition of that organ in this disease, it would appear that their operation differs much from that of opium, which agent is used by drunkards to render themselves sober. I remember a medical man who habitually took morphine for the purpose of recovering himself from intoxication, and who on one occasion took so large a dose that he died in consequence. We must not at once withdraw the opium when it has produced the desired effect—sleep; but continue to use it for a short time in lessened doses.

But delirium tremens does not always assume the marked symptoms by which it is usually characterised. A modified form is found among those who are habitual tipplers. In them there is no delirium, but the mind is confused and unsettled, and they get very little sleep. They follow their ordinary occupation, though they feel ill, have a good deal

of tremor, and a peculiar, hurried, manner. They often have signs of gastritis, with a creamy-coated tongue. Remedies addressed to the stomach, the exhibition of moderate doses of opium, and light, nourishing diet, quickly restore such patients.

Again, among the poor we often meet with a state closely bordering upon that just described. In them, however, the disorder is not induced by spirituous liquors, but by privations. There is no delirium, they get but little sleep; their manner is agitated, they have tremors, are very desponding, and fearful lest they should lose their reason. Tonics, nourishing diet, and small doses of opium, quickly bring about recovery.

In the cerebral affections of children, opium is of much greater use than is generally supposed. Until of late a large class of these affections was attributed to inflammatory action, but is now known to depend on an opposite condition of brain: and there can be no doubt that very many cases which are even now considered to be of an inflammatory nature are not so in fact, and also that effusion of serum and softening of the cerebral centres are not proofs of inflammatory action, unless they are accompanied by indubitable evidence of vascular excess. Such cases, moreover, neither require nor bear antiphlogistic measures. On the contrary, and especially in their early

stage, they are benefited by support and by opium. The prejudice against the use of opium in children is far too great. In them I have used it extensively, and with much advantage, in affection of the head and abdomen, and have found it to be of particular service in severe diarrhœa and the coma consequent.

In many general diseases, especially in those of an acute character, the nervous system becomes much deranged and, thus disturbed, forms not only an important feature of the disease, as to symptoms, but indicates a point to which our treatment should be continually directed. Fever affords a good illustration of this, and may be taken as the type of the class of diseases to which reference is here made.

In fever there is always more or less disorder of the brain, and in very many cases the danger of the patient depends upon this disorder. The brain and its vascular supply have a certain relation to each other. If this is kept and the cerebral and vascular excitement proceed equally in activity and to extremes, we have the fiercest delirium, accompanied by the highest vascular energy: in short, absolute phrenitis. But this is rare, or at least does not last long; and clearly the proper treatment is antiphlogistic. In the majority of cases, after a short time this relation between the affection of the brain and of its vessels is lost, and the one or the other pre-

dominates. The most usual course in these instances is, that from the first, or very soon after, the disorder of the organ outstrips the disorder of the vessels. In most cases, however, this disparity does not show itself with sufficient prominence to demand especial treatment, until the disease has existed for some time. But after a while the symptoms of cerebral disturbance rapidly assume such importance that our attention is necessarily called chiefly to them. The degree in which they may exist varies much. There may be wakefulness, anxiety, sudden failing of strength, weakness and rapidity of pulse, dryness and tremulousness of the tongue, involuntary evacuations, muttering delirium, rapid sinking; or the symptoms may be more violent: as furious delirium, constant talking, singing, struggling to get out of bed—all continued night and day, until the patient sinks and dies. But whether the patient rapidly sinks into low muttering delirium or rages in ferocious excitement, sleeplessness is ever present.

Now, in these cases we want something that will act upon the brain and give it rest; recall it to its healthy function, and to the repose which induces sleep and brings about recovery. The great resemblance between this state of the brain in fever and that in delirium tremens naturally suggests similarity of treatment. Opium is the remedy for both. Yet it

must be given more cautiously and sparingly in affection of the brain in fever than in delirium tremens. The nearer, however, the case approaches delirium tremens—both as regards the habits of the patient and the kind of his delirium,—the nearer should our treatment be to what is usual in that disease. As a general rule, and as is the case with all other remedies, the quantity of opium administered should be proportionate to the severity of the symptoms. Mild delirium does not require so large a dose as fierce. As in delirium tremens, we must not only be cautious as to dose, but as to repetition. The effect must be watched, and the remedy should not be repeated until a few hours have elapsed. If then there be no appearance of sleep, and no tranquillity, the dose may safely be repeated. But it occasionally happens, that though the patient has not enjoyed sleep, he has dozed or remained quite tranquil, the symptoms referrible to the brain being much relieved or gone. Under such circumstances, it is better not to repeat the remedy until its effect has been watched for several hours; and then, if a decided improvement be not apparent, the dose may be repeated. In mild cases very small doses may be given at shorter intervals than in the severer cases, until sleep is produced.

It may be laid down as a rule of practice in the treatment of fever, that if prolonged sleeplessness

supervenes, at any period of the disease, and is unaccompanied by vascular excitement within the head, or at least by a vascular excitement less active than the cerebral, opium may not only be given, but is of all remedies that which is most demanded.

But there are cases of common occurrence in which the vascular excitement takes the precedence, and becomes predominant over the cerebral. These cases are in general easily distinguished, and require remedies that are directed to the vascular system: as depletion, &c. Still, when the vascular excitement has been subdued, the cerebral is apt to show itself, and needs, and is benefited by, much the same treatment as that which is appropriate when the cerebral excitement predominates from the first. These cases, however, are not always so simple: for it not unfrequently happens, especially in fever, that there is intense cerebral excitement and considerable vascular excitement also. Yet the state of the system forbids the use of depletory measures, or, if they have been already used, will not allow them to be carried further. We must stay our hand, not only because the abstraction of even a small quantity of blood may be dangerous, but also because experience has taught us that the local affection is not improved by such abstraction.

In these cases there is no question, so far as the

brain is concerned, that opium is the remedy needed. But as the condition of the vascular system in the head forbids its use, something is wanted which can counteract this condition, and antimony is found to do so. The vascular excitement about the head is frequently great in these cases. The face is flushed, the carotid and temporal arteries beat strongly, the eyes are suffused and bloodshot; there are headache, fierce delirium, sleeplessness, &c.; but the flush of the face alternates with paleness; the pulse is weak, often wretchedly feeble; there are much tremor and subsultus. In short, such a train of symptoms is present as is frequently seen in the advanced stage of fever, and which, so far as the head is concerned, suggests depletion, while the state of the pulse and other signs of debility entirely forbid it. Although opium is much needed, yet the action in the head is such, that if that remedy were given alone there would be great danger of coma. Emetic tartar, however, calms the vascular excitement, counteracts the tendency of opium to increase that condition, and brings the brain into a state appropriate to the display of the peculiar powers of that potent remedy. Indeed, by its calming influence, antimony is sometimes able, alone and unaided, to relieve the nervous excitement, so that sleep follows. Yet, as this effect is uncertain and chiefly indirect, the safer and better mode is to give the antimony in com-

bination with opium, which has a direct influence in bringing about what we desire. But opium should be given in much smaller doses in these cases than in those in which antimony is not required. As a general remark, it may be said, that when the vascular excitement exceeds the cerebral, the emetic tartar must be given in greater proportion to the opium, than when the cerebral excitement is in excess; and that when the cerebral excitement predominates, the opium must bear a greater ratio to the antimony, than when the vascular excitement prevails. Yet, in no mixed case should the dose of opium be so large as in those cases which are free from vascular excitement.

Under the combined operation of the opium and emetic tartar, the pulse, from being rapid and a mere thread, becomes slower, fuller, and soft. The violent beating of the carotids and temporals becomes less. The fierce aspect of the eye and face lessens, and the suffusion subsides. The delirium wears away, and the patient, after lying tranquil for a time, sinks into sleep. Thus a most perilous condition of brain, one in which the most active vascular excitement is going on at a time when we are least able to resist it, is often rapidly relieved: the vascular excitement being effectually controlled by the antimony, and the cerebral excitement being calmed by the opium. If the heat of the head is very considerable, cold applications are

valuable auxiliaries. But in very many cases, even when the head is hot, the application of cold to the part causes an unpleasant chilliness throughout the body, which often is already below the natural standard in regard to heat.

The preceding remarks refer more particularly to affections of the head as they occur in fever. These remarks, however, may have a wider scope, since much the same state of brain occurs in various diseases, and requires the same kind of treatment: it being always remembered, nevertheless, that in fever there are necessarily certain modifications in regard to the general system which are not necessarily existent when the fever-poison is not present. In the advanced stage of ordinary inflammation of the cerebral substance, after the usual antiphlogistic remedies have been properly and successfully employed, great nicety of judgment is required to determine whether depletion shall be carried further, or a dose of opium and support be given. In concluding these observations, I may make the general remark, that in inflammatory affection of the nervous system opium is inadmissible during the active stage; but that in irritation of that system it is eminently useful: and that therefore in the course of inflammatory affection of the nervous system, and even of the centres, opium should not be

used until the disease has lapsed into a condition partaking largely of irritation.

The effects of opium upon the *vascular system* and upon the *formative tissue* do not appear to have that decided influence over the progress of local disease which characterises the effects of some other agents upon that system and tissue. Yet opium is invaluable for its property of sustaining the vascular system when depressed by the occurrence of some sudden and extensive disease: and that it has considerable effect upon the formative tissue is illustrated by its evident operation upon the secretions in general, and particularly upon those of the skin and bowels.

It is, however, in certain severe inflammatory attacks that the remarkable effects of opium upon the circulatory system and formative tissue are best seen. The cases in which it is of most service are usually distinguished by great shock to the system and rapid failing of the vital powers. The local disease is severe, the constitutional disturbance great and peculiar. Instead of excitement there is depression. The local pain and general distress, and the sickly and deadly feeling experienced in these cases, are very characteristic. These symptoms most commonly arise from a cause in the abdomen: such as perforation of the stomach or intestines, especially in the course of fever

or phthisis; rupture of the liver, the bursting of abscess or other formation into the abdomen, rupture of the uterus, bladder, &c. On the occurrence of such accidents, peritonitis of an alarming character is set up. Yet peritonitis from these causes does not always show itself in a manner so evident. In the case of perforation, in particular, it occasionally supervenes very insidiously, especially during the course of a severe disease. The patient is found to have become suddenly worse, and, in fact, to be sinking. There is no complaint of pain in the abdomen, but if that part is attentively examined, some degree of uneasiness and tenderness under firm pressure are discovered.

In speaking of these cases it may be remarked, that the visceral contents which escape are generally trifling in amount and chiefly gaseous, and that the communication between the viscus and the peritoneum is in most cases closed very soon after the accident has occurred. Hence we may be encouraged by the hope, that if the patient can rally from the effects of the shock, the case will resolve itself into one of simple, though severe, peritonitis. And this hope must direct our treatment.

But peritonitis as formidable as that just noticed, and requiring much the same treatment, may arise without perforation or rupture: as is seen in the puerperal state. In some of such instances the local

disease is slight, in comparison with the systemic disturbance. In others, the local disease makes rapid and perilous progress, and (as the amount of effusion shows) seems to grow in strength and in extent as the powers of life fail. Moreover, in many cases of puerperal peritonitis the whole system appears to labour under the depressing influence of a morbid poison. Therefore, the local disease, although it has a tendency to depress the system, is not the only cause of the typhoid condition under which so many puerperal patients suffer.

Now in all these instances of peritonitis the ordinary antiphlogistic treatment is unavailing. To bleed is but to depress the system, aggravate the disease, and hasten the fatal issue. Our object must be to cherish the vital powers. It is clear that if we can shield the system from the baneful effects of the local disease we shall greatly increase the chance of recovery; not only by preventing the general irritation which must arise from the diseased part, but also by preventing the reaction of the irritated and feverish system upon the local affection: for there can be no doubt that such irritation and reaction greatly aggravate each other and increase the tendency to death.

Now opium appears to possess, in no mean degree, the power we need. But to be efficient, the remedy must be freely used. It must be not only

given, but be given in large doses: for doses which in health would cause sleep, or even coma, now produce no sensible effect. I am well aware of the danger of masking a disease by blunting the severity of its symptoms; but opium does not produce this undesirable result, so long as its narcotic effect is absent. When given short of that effect, the remedy causes a calm throughout the system, and greatly lessens or prevents the irritation, shock, and depression, which the presence of severe local disease induces. Moreover, it soothes and diminishes the sensitiveness of the diseased part itself: for it is highly probable that the inordinate reaction of blood vessels and formative tissue upon each other is in these cases often sustained by an excited state of nerves, the calming of which much contributes to the recovery of the part diseased.

Our object, then, in giving opium is to afford the affected part a respite, to check the general excitement, to support the vital powers. We endeavour not to give ease to the patient by blunting the sensations which nature has given him for safeguards and warnings, but to keep them from running into excess, to localise the disease, to moderate its course, and to sustain the system. Where does the danger lie in these cases? In the loss of the physiological action of the part affected, and the consequent derangement of the whole system; in the pollution of the blood; in

the irritation, shock, and depression of the entire body, through the nerves. In these consequences is the chief danger. The parts affected in these cases are not so intricate and not so easily spoiled as some other organs are, and yet the diseases of no other organs produce such a severe effect upon the system as the diseases of these parts, and of the bowels above the rest. If gangrene occurs in them, even only to a small extent, death rapidly ensues. Yet gangrene is not nearly so soon fatal in other parts. In gangrene of the lungs, the patient frequently survives many days, and even weeks. Although opium may be used with advantage in most of the severe inflammatory diseases that cause great shock to the system, and also in the case of extensive burns or scalds, which give rise to very similar effects upon the body, still it is in formidable disease of the abdomen that the value of the remedy is most apparent. It quiets irritation, deadens the shock, and calms and supports the system under the depressing influence peculiar to these affections; lessens the frequency and increases the power of the pulse; moderates the peristaltic and other actions of the intestines, so as to lull pain and prevent colic; diminishes, and frequently in a few hours removes, the tenderness felt on pressure; and checks the inordinate secretion which so commonly occurs when the mucous membrane is involved.

Hitherto, opium has been mentioned as the only remedy for the severe abdominal affections just noticed, which act so powerfully upon the system and are so fearfully rapid in their course. But in some of these cases, although the patient escapes from the imminent peril, yet the mischief done, and perhaps proceeding, has to be repaired or stayed. Opium cannot do this, and mercury is required, which, when we have reason to fear that the disease will run on to structural change, should be given early in the attack and be continued until recovery appears complete.

Again, the disease may assume a form in which, though opium is the chief remedy, the local action is of such a nature as to require topical depletion—there being considerable tenderness and soreness of the abdomen combined with much depression of the system. To suppose that opium is useful only in the extreme cases spoken of is to have too limited a notion of its value in inflammation. Many cases of mild enteritis are best treated with opium and leeches. The opium should be given in very moderate doses; the leeches should be applied in moderate numbers to the tender spots. These cases do not generally run on to much effusion, and, therefore, when the local action is subdued, the patient is cured. When, however, there is effusion, small doses of mercury must be added to the opium, and be continued alone after the

necessity for the opium is over, until the mischief is removed. Even in acute peritonitis and enteritis, when the violence of the disease demands, and is relieved by, venesection, opium is of great service, particularly in the latter stage of the disease. In cases, too, in which mercury is desirable, but disagrees, opium often rallies the patient and ultimately enables him to bear the mercury.

In inflammation of the mucous membrane of the bowels, opium is frequently of great service. Many tedious cases of that disease receive decided benefit from its employment.

In chronic affections of the stomach of a low inflammatory character, small and repeated doses of opium are highly useful; especially when the affection is of long standing and gives the notion of organic disease, from being attended by constant pain, much increased by food, which is almost always rejected, by tenderness at the epigastrium, and abundant pyrosis.

In certain cases of acute rheumatism, opium is very beneficial; apparently in those in which, though there may be considerable vascular excitement, pain, and swelling, there is want of power and inability to bear bleeding and other antiphlogistic remedies: in which the distress seems to be referrible more to the nervous than to the vascular system, the pain being remarkably shifting. In these cases it is essential that

the opium should be given in full doses until relief is obtained.

In concluding these observations upon opium, I may notice the practice of giving that remedy in a full dose after a full bleeding from the arm. Such practice is unquestionably useful in some cases of incipient inflammation. In the case of the brain especially, the sudden abstraction of blood produces a condition of organ that often enables a dose of opium to restore its function. In inflammation in general, a full bleeding is often followed by a sort of hæmorrhagic reaction, the nervous system becoming disturbed and a feeling of distress arising throughout the body. In these instances the local disease, although at first checked by the bleeding, is frequently renewed. But a full dose of opium generally quiets the disturbed system and stays the tendency to renewed unhealthy action in the affected part.

HYDROCYANIC ACID.

Hydrocyanic acid is universally admitted to have very considerable remedial power over the animal economy. Its sudden and fatal effect when given in an over-dose seems to show that it acts immediately

upon the *nervous system*. The probability is that its operation is limited to that system; that its effects upon organs—the stomach for example—are produced through the nerves which supply them: in other words, that it has no effect upon either the vascular system or the formative tissue, except through altered nervous influence.

Its action upon the stomach is very marked and establishes it as a valuable remedy in some of the diseases of that organ. It, however, does not appear to have much effect in inflammation or in structural change. It does good by allaying pain and lessening irritability; effects very important in the diseases of an organ which has such functions as those of the stomach. But though it has not a direct action upon the inflammatory process, it must materially aid remedies that have. In affections of the stomach one of the most distressing symptoms is vomiting, over which hydrocyanic acid has great control. It not only lessens the degree of irritability and irritation which induces vomiting, but by preventing the act, it prevents the attendant distress and the consequent aggravation of the morbid process. The pain that frequently accompanies various conditions of stomach, whether inflammatory or not, and comes on at uncertain times—gastrodynia,—is almost invariably relieved by this remedy. But the pain that arises from irritation, dis-

eased secretion, &c., requires the removal or neutralisation of the cause before the remedy can have its full effect upon the disordered nervous function. Now, although theoretically speaking, the expectation of benefit from hydrocyanic acid in organic disease of the stomach may appear to be almost hopeless, we nevertheless find, even when great disorganisation exists, that relief does follow the administration of this agent, notwithstanding that no improved structural change is effected. Irritation is allayed, pain mitigated, vomiting prevented. Probably these results are brought about by relief afforded to the not yet disorganised mucous membrane, the state of which often gives rise to a variety of distressing symptoms.

In enterodynia, properly so called, hydrocyanic acid is as useful as in gastrodynia.

As has been before said, hydrocyanic acid seems to find its proper sphere of action in the nervous system: and it probably acts in a special manner upon the excito-motary part.

The spasmodic affections of the respiratory function are for the most part relieved by this remedy. In hooping-cough, asthma, convulsive cough, and even cough connected with absolute disease of the lungs, provided that the cough is out of proportion to the diseased action: in all these affections, hydrocyanic acid is beneficial, and in hooping-cough especially.

The benefit said to be derived from hydrocyanic acid in phthisis seems to depend on the relief given to the spasmodic cough which is often met with in that disease.

In angina pectoris also, hydrocyanic acid is a valuable remedy. It affords relief even when the paroxysm arises from structural disease. It is not only serviceable during the attack, but in the interval also. Indeed, to secure its good effect, it is necessary to give it regularly for a considerable period. When angina depends on disordered stomach, the remedy acts beneficially by improving the condition of the stomach at the same time that it is influencing the heart.

Advantage also sometimes attends the use of hydrocyanic acid in palsy and convulsive tremors. Here it may be asked, does it benefit hydrophobia or chorea?

It is of much service when the stomach is too irritable to bear necessary remedies, which, however, will often be retained when hydrocyanic acid is given with them, or a few minutes before them.

STRAMONIUM.

STRAMONIUM acts through the *nervous system*. Its value as a medicine consists in its property of lessen-

ing pain. It relieves by producing a remarkable calmness and ease. It does not induce sleep, except in so far as release from pain disposes to that state. Acute pain is generally diminished, if not removed, soon after this remedy is taken. A sensation like incipient intoxication, some nausea, and a peculiar feeling about the throat, are common consequences of the exhibition of this agent. This feeling in the throat is in some degree a test of the efficient operation of the remedy, and is necessarily often felt before its good effects are seen; just as ptyalism is in the case of mercury. Stramonium does not cause constipation, but on the contrary, often slightly relaxes the bowels. It scarcely affects the pulse. It does not congest the head.

Its chief use is in various painful affections of the nerves. Suffering of this sort, frequently occurring without apparent cause and inflicting infinite distress, is often immediately removed by this remedy. But pain is frequently the remnant of actual disease; as in rheumatism, for example, in which obstinate pain sometimes settles in the part when all the other signs of the disease are gone. This kind of pain, stramonium will commonly relieve.

STRYCHNINE.

Strychnine acts through the *nervous system*, and appears to spend most of its energy upon that system itself. It does not seem to have much action upon the general formative tissue, except by influencing the nervous supply conveyed to that tissue. It seems also not to affect—certainly not in a marked degree—the brain in relation to the sensorial function, but to chiefly exert its power upon the medulla oblongata and spinal cord.

In using strychnine the essential point is that it should be brought into contact with nerve, whether through an absorbing surface or the circulation. Thus in dropped-hands from lead very great advantage frequently follows the application of strychnine to the blistered surface of the fore-arm, after the internal use of the agent has failed.

Although strychnine possesses great power over the body, its medical use is confined within narrow limits. As a general rule, it is of much service in cases of paralysis dependent upon insufficient nervous supply. Yet the cases must be peculiar in character. The nervous supply must be imperfect either from some diseased action long since ceased, as in apoplectic clot; or from the occurrence of loss of power in the

nerve itself, as from lead. The effects of strychnine plainly show that it operates, in part at least, as a stimulant to the muscular system through the nervous. The muscles of a paralytic limb seem to require such a stimulant. But the remedy not only stimulates the muscle through the nerve, but restores the nerve itself to proper action. In curing paralysis, strychnine has no share in removing the original cause of the disease. The remedy is efficient by merely exciting the nerve to action, the original cause being at the time either removed or greatly modified by some other means. Indeed, unless the local mischief is at rest, this medicine will excite it to fresh activity.

Strychnine has been found useful in local paralysis, in some forms of amaurosis, in dyspepsia apparently depending on loss of nervous tone, and even in cases which required a general tonic.

In a word, whenever there is deficient nervous supply not referrible to disease actually proceeding; whenever the nerves distributed to a muscle or to the formative tissue need stimulation; then strychnine is safe and effective.

Strychnine is preferable in use to nux vomica, the dose at the commencement being one-twentieth to one-sixteenth of a grain, which may be gradually increased until some effect is evinced in the muscular system.

Strychnine has been used with advantage in dysentery and diarrhœa, especially when the discharge has been abundant and watery, as if dependent on want of tone.

QUININE.

Quinine is the most popular of tonics, and, though very indiscriminately employed, has proved itself worthy of its high reputation. The pain, or perhaps sense of fulness, in the head, buzzing in the ears, giddiness, confusion of mind—and when the dose has been large, even blindness, deafness, feeling of intoxication—which sometimes follow its employment; its powerful and quick effect upon intermitting disorders of the nerves and upon intermittent fever; all show how potently this remedy acts upon the *nervous system*, and fairly suggest the supposition that through this system it is that it operates upon the formative tissue. Its agency appears to rouse this tissue to increased energy, to give it augmented power; as is seen in the great debility after fever, in which, however, it is probable that the nervous system also receives to itself an appropriate stimulus from the remedy: for the fact that such great and quickly

induced debility is quickly remedied (in no disease is convalescence so rapid as in fever) seems to indicate that the nervous system is much involved, and that the salutary impression made upon it in particular is greatly instrumental in restoring the health. Be this as it may, in such instances the formative tissue is much reduced in energy—the powers of life are much depressed; and though in the majority of cases the poison may be thrown off, the febrile excitement subside, and the strength quickly improve, almost without the aid of tonics; there are others in which languor, want of appetite, quick pulse (but without apparent disease of any organ) show that the system is unable to rally, and may be about to incur very serious danger in the form of anæmia, phthisis, or some other alarming disease.

In such circumstances the influence of quinine is highly valuable, rapid, and unmistakable. The pulse falls, the appetite improves, the flesh and strength return. This depression of the vital powers is always seen when the system is affected by a morbid poison, such as that of fever and the exanthemata. Now, though quinine is not suitable to most of these cases so long as the poison is working in the system, it is of use in some; and in all cases it is of essential service when the poison has exhausted itself or withdrawn. The excitement of the system consequent upon the

presence of the poison, especially when the disease has a definite course—as eruptive fevers—is not a state in which quinine is useful. It does not appear to have any power over the poison. It may possibly sometimes enable the system to resist the evil agent, and to throw off it and its effects; but so long as the poison is in full force, has fairly hold of the system, and has not reached its highest point of influence, quinine is almost always not only useless, but apt to increase the excitement and make matters worse. How far its administration at the outset of such cases may be beneficial is a subject worthy of investigation; but when the disease is fully formed, we must wait for the period of its declension, and if the debility is then great, quinine will be very useful.

But there are some diseases which arise from certain poisons—perhaps of vegetable origin exclusively—in which quinine is valuable throughout their course. These, however, are not diseases which have a definite career. The most remarkable of them are the fevers of the Tropics, which spring from malaria and run a very rapid course. Them quinine often cuts short, especially when it is given in their early stage. Indeed this agent has a reputation for curing most of the fevers of hot climates; and as these diseases are rapid in their progress, the remedy must be used actively and in very large doses.

In these cases it seems to act by producing a strong impression upon the body, probably through the nervous system. And in connexion with this, it may be asked, is the fever itself caused by the action of some poison upon the body through the nerves, and is the action of this poison stopped or modified by an impression from the remedy, also through the nerves? The intermittent fevers of this country, which bear a strong resemblance to the fevers of the Tropics, are almost invariably stopped by quinine; besides which there are also other agents that cut short these affections, as pepper, emetics, bleeding; in a word, many means which produce a powerful impression—a sort of shock to the system.

In intermittents is it possible that the poison, having been received into the system, requires a definite time in order to increase in quantity and acquire a certain strength before the paroxysm can burst forth; and that the paroxysm, when it has occurred, ends by expelling the excess of poison, only to re-occur when the poison has again attained sufficient quantity and strength? In other words, is there a law which requires a definite time to elapse before the poison obtains sufficient power to act upon the system, and is the periodic character of the disease dependent on the operation of this law, the intensity of the paroxysm being in proportion to the

effort made by the system to expel the poison; an effort generally inadequate to the expulsion of the whole, so that at the definite period the paroxysm returns? If the rapidly fatal fevers of the Tropics be essentially the same as our intermittents in nature and origin, may it not be that their fatality arises from the inability of the system to throw off the poison, by reason either of its abundance or its virulence, so that the patient quickly sinks under the attempt?

But how is the paroxysm of ague produced? By the action of the poison upon the nervous system? We know that the passage of the catheter may cause a paroxysm precisely like that of ague, and how is this to be accounted for if not by the agency of the nervous system? Now if we suppose that the poison acts through the nervous system, may it not be that quinine so affects that system as to render it insensible to the influence of the poison? Again, may not the shock of the remedy so act upon that system as to make it the instrument of alteration in the poison itself and the cause of its expulsion from the body?

In intermittents we do not give quinine as we do when our object is to produce its tonic effect alone. The dose should be large—large enough to cause a shock, in order that the paroxysm may be broken or

prevented, and that this interruption to the periodical character of the disease may come in aid of cure. If a large dose is given shortly before the fit is expected, its occurrence will be almost always prevented. Perhaps the best practice is to give a full dose — say ten grains — an hour or two before the paroxysm is expected, and to continue the remedy in smaller doses during the twenty-four hours.

Yet, however valuable quinine may be in intermittents, it must not be indiscriminately employed. If the patient is very plethoric, or has a tendency to congestion in some organ, the remedy may be not only comparatively inefficient, but unsafe. Indeed, so marked is the influence of a congested or inflamed organ over the operation of quinine, that at times its action cannot be obtained until the congestion or inflammation is removed by bleeding, purging, &c., according to the necessity of the case. The remedy succeeds best when complications do not exist.

Certain forms of inflammation on the surface of the body, occurring abruptly, proceeding rapidly, having an erratic character, and in which the part affected is swollen, red, hot, and painful, but in which these symptoms subside to re-appear elsewhere ; certain forms of erysipelas and erythema ; urticaria also, when not induced by irritation of the stomach : all these will a few doses of quinine sometimes sweep away. But how ?

May it not be that the impression received by the nerves from quinine is in these cases carried by them to the suffering part, which is thus brought back from its languishing, feeble state to health? or that — as is often seen when inflammation of an organ is over, and in the case of wounds on the surface of the body —the entire system, so far as relates to power, being in a state similar to that of the diseased part, which is in fact an index of the general condition, the quinine cures by invigorating the whole body, and therefore the part affected? In this case the quinine acts as directly as bloodletting acts in an opposite state of the part and system. The one at once depresses the excited organic energy of the formative tissue and gives it the chance of sinking to its natural standard; the other, through the nerves, directly rouses the energy of the tissue and affords it the opportunity of recovering its healthy tone. Thus the same end is attained by different means, because the conditions are different.

The treatment of erysipelas and of other inflammatory affections depending on a morbid poison is in some respects peculiar. In those affections the whole system is more depressed than in any other form of inflammation. In short, there is inflammation and something more. A poison oppresses the system, and through it modifies the local disease: for how-

ever the process of inflammation may be explained, there can be no doubt that it is greatly influenced by the state of the system at large. On the one hand, general antiphlogistic remedies may be necessary, to moderate the local action and stay it from running on to excess and to destruction of the part; on the other, remedies may be required that can support the system under irritation caused by the local disease, and prevent the action of the part from becoming so low and languishing as to be at the same time incapable of repairing mischief done and instrumental in the production of various unhealthy changes.

This influence of the state of system over local disease is plainly seen in some forms of iritis. In them there is no question about the existence of inflammation. The pain, state of vessels, deposit of lymph, prove that. Now, for the most part in iritis, the moment the system is affected by mercury, the lymph begins to diminish, and finally disappears. But there are cases in which, immediately that the system is affected by mercury, the lymph rapidly increases and all the symptoms grow worse. How is this? Inflammation exists in both cases, but in the one with increased, in the other with diminished, power. In the two cases the practised observer notes that the whole appearance of the eye is different in character, though the same in kind; and therefore he

knows that, while in the one, the use of mercury is eminently beneficial, in the other, tonic treatment is followed by the best results.

When appropriately employed in these cases, quinine produces a good effect, as rapid and as evident as that of mercury. Under its use the inordinate action and pain quickly subside, and the lymph steadily disappears. Yet it is to be feared that even in these days there are men who do not understand these points of treatment; who cannot in their minds separate inflammation from antiphlogistic remedies, but indiscriminately push them on with energy, often to the aggravation of the disease. Now, what occurs in the eye occurs in other parts of the body, which are subject to the same laws, suffer the same changes, and are relieved or cured by the same treatment. What in the one case is seen is in the other inferred, and the experience drawn from the one must be our guide in the treatment of both. Indeed, if inflammation be the process generally supposed, it must have many shades of difference which require modifications in our curative means, modifications varying from an active antiphlogistic treatment to one of an opposite, a stimulating character. So also may it need, and frequently too, a combination of these opposite modes of treatment: for though the vessels are of themselves unable to produce the results of the

morbid process, they may, nevertheless, by remaining passive and loaded, irritate the formative tissue and so alter its action as to much modify the disease. Hence it may be necessary to unload the vessels by topical means. Again, it is probable that the vessels may be so influenced by remedies through the nervous system as to have their calibre altered—to have increased tonicity imparted to them. Quinine is perhaps able to effect this. But how is it that a remedy which must act generally throughout the capillaries particularly affects the part diseased? Whenever any part of the system is under diseased action, however slight, we know that if the body at large suffers from excess in food, fatigue, or other cause, the local disease is immediately increased. In like manner, the effect of quinine upon the whole system is especially felt in the suffering part, which is more alive to impressions, whether for good or for evil, than the rest of the frame.

Like as quinine gives tonicity to the vessels of the affected part, so may it give tone to the organic energy of the formative tissue itself: for in some forms of inflammation, and in some stages of most forms, the formative tissue is much benefited by quinine. In a certain flabbiness of parts, especially of the mucous membrane, and particularly when inflammation is on the decline or has altogether ceased, the tone of the part is so impaired that

abundant watery exudation occurs from a slight cause. For example: if after a cold—just as it is about to cease—the head be held for a minute or two in a dependent position, an abundant exudation will be induced. In this instance—cold—a dose of quinine will frequently cut short the disorder, particularly when its activity is over. The kind of local action just mentioned is almost always an index of the state of the general system, and points alike to the condition of the disease, to its treatment, and to the body's wants.

Erysipelas is an instance which well illustrates the folly of always treating a disease upon the same plan. Some years ago the common and doubtless often successful mode of treating this affection was the exhibition of large quantities of bark, which medicine was supposed to have a specific effect. It is probable that the cases benefited were of a low type, or that, at any rate, they were not characterised by any severe inflammatory action. At the present time also we find that, upon the whole, erysipelas needs support, either at the commencement or very soon after. Yet, when the pulse is firm and the inflammatory action decided, bloodletting may be used with great advantage—recovery being quickened. These cases, however, are met with in the plethoric only; and if the patient is shattered or weakly, an opposite treatment must be

employed: for there appears to be this peculiarity about erysipelas, that its poison depresses the powers of life in the feeble to a greater relative extent than in the strong.

It may here be noticed that the retrocession of the rash in eruptive fevers and the often suddenly occurring paleness of other eruptions are frequently ascribed to debility, and that quinine or some other tonic is on that account employed. These changes, however, do not commonly happen from debility, but for the most part show that some internal inflammation has occurred, to which the powers of life are attracted, and on which they are spent.

ALIMENTARY CANAL.

So much has already been incidentally said in relation to the alimentary canal as a field for the operation of remedies, that little remains to be noticed. I shall, however, offer a few remarks upon it as a system in which diseased actions are very prone to arise, the effects of which are carried to and felt by the frame at large; and shall attempt to show concisely that remedies may be applied to it in order so to modify its function that the whole body may be

affected thereby, and also that powerful impressions may be conveyed to distant parts by the very direct and rapid action of medicines upon the formative tissue of this system, and consequently upon the nerves and vessels by which it is supplied: in a word, that as certain remedies act upon the circulatory and nervous systems and so influence them that effects follow which are felt in all the vital operations of the body, so do certain remedies act upon the alimentary canal and upon it produce effects which have a direct and indirect influence over the whole system. And though the life of the individual is not so immediately dependent upon the proper performance of the function of the alimentary canal as upon the state of the vascular and nervous systems, yet the alimentary canal is not less worthy than they of our consideration: for it is a very common focus of morbid action, whether manifested or concealed, and also is speedily excited or converted into a great remedial engine, prompt, powerful, and safe. In the former of these characters, we must regard it as a laboratory in which diseased compounds are formed that ultimately find their way into every part of the system and variously disturb its functions. We must in all cases of disease attentively examine the condition of this canal and carefully watch its numerous and important sympathies. We must consider the curative influence that it is capable of

diffusing over, and by means of, the vascular and nervous systems, as well as its own highly important excretory function.

It is not my intention, however, to enter upon the diseases of this system of organs, or even to treat of its disorders in detail. I shall limit myself to a few prominent points which have immediate reference to the general treatment of disease.

The direct action of medicines upon the alimentary canal may for practical purposes be regarded in relation to three effects: the removal of irritating and noxious matters; the promotion and improvement of secretion; the promotion of excretion.

From many causes, which need no mention here, the refuse of the food may not be propelled through the canal and be expelled from it, but may be allowed to remain therein, especially in the large intestine. The less degree of this state—habitual costiveness—is sufficient to materially injure the general health; but when the interruption of function amounts to protracted constipation, it becomes a serious cause of disease: for though a mass of organic matter may, by the influence of the living structure with which it is in contact and by the antiseptic property of some of its component parts, be preserved for a while from the changes which warmth and moisture engender or promote, yet the time arrives, and quickly too, when the

preserving forces are no longer able to stay the alterations to which such matter is obnoxious, and to the acceleration of which it is probable that certain states of the system tend. Healthy feculent matter, though disagreeable in odour, is never in a decomposed condition; but in some diseased states it is all but decomposed, and in extreme cases is decidedly putrid. It is beyond doubt that healthy fæces too long retained are absorbed by the bowels, and in consequence produce various evil results, such as disordered general health, lassitude, sallow complexion, loss of appetite, fetid breath and secretions—the secretion of the skin being particularly unpleasant. But the absorption of decomposed fæcal matter is followed by alarming results. The depraved matter, by its contiguity to the nerves so largely distributed over the intestines—nerves too of a peculiar order—seriously deranges the whole nervous system; though similar effects upon this system may also arise from the action, through the circulation, of the morbid matter upon the centres. By it moreover the vital endowments of the bowels themselves are disturbed, in consequence of the irritation of the secretory and excretory apparatus and the perversion of their functions which its presence produces. Under such conditions it is that the worst forms of what is called intestinal irritation arise; some shock or excitement, such as parturition,

being the immediate cause. Intestinal irritation, however, may complicate any disease, and this fact should be always borne in mind.

Now, under all the circumstances just mentioned, it is evident that our first care must be to clear the bowels; and as accumulation and obstruction most frequently occur in the large intestine, a copious enema will best effect our purpose. But though we can by the judicious use of this means clear out the large intestine as far as the cæcum, we must not neglect the use of purgatives: for, notwithstanding that fæces seldom accumulate in the small intestine, it constantly happens that morbid matters, derived from the food or from disordered secretion, linger there, and require an impulse from above to hasten their progress downward.

Yet while in these cases of accumulation and irritation active purgatives are necessary, the depressing effects inseparable from their use, combined with the injury previously received by the nervous and vascular systems, produce in extreme cases fatal syncope, and in most cases much exhaustion. The effects of the remedy and the disease together often cause alarming symptoms, as intense headache, intolerance of light and sound, sleeplessness, delirium; great throbbing in the head and other parts, rapid pulse, &c.; yet all without power: the system in fact labouring under

such debility that the heart may cease to beat and fatal syncope ensue, or effusion in the head take place and fatal coma follow. These accidents, however, may be almost certainly prevented by the judicious use of opium and stimulants. Combined with these, purgatives may be used much more freely than would be safe without them, though still they should be given only to the extent necessary for the removal of the depraved matter from the intestine.

But remedies are employed upon the intestinal surface for purposes more important than the removal of hurtful contents. Such a removal, however desirable in itself, must be considered as an aid towards the cure of disease, rather than as a chief cause in the result; as a thing necessary to be done in order that the body may become whole, rather than as a means to make it so.

Certain medicines have a direct control over many of the processes which are, with more or less energy, continually in action upon the intestinal surface. If these processes are hastened, they, by exciting the sympathy which binds all the viscera of the abdomen together, affect particular organs and parts that are closely connected with the bowels, and also, through the portal circulation, cause an absolute drain upon, and loss to, the vascular system. These combined effects make a rapid, powerful, and lasting impression

upon every part of the frame. Yet, if some of these processes are going on with more than normal activity (as in diarrhœa), so as to manifestly reduce the vital powers of the individual, or to complicate other disorders under which he may be suffering, we have at our disposal remedies that act directly upon, and are able to check, these processes.

In the catalogue of means for the production of the first named effect (the hastening of the processes mentioned) most purgatives are comprised. These, while they induce a common result, do so in such different ways that it is necessary to select them according to the particular object in view. But though there is without doubt some peculiarity in the action of each purgative, there seems to be, in different degrees, one effect that is produced by them all; namely, an increase in the ordinary secretion of the bowels. Of some, as the sulphate of magnesia and other salines, this appears to be the chief effect. Others, as senna, jalap, aloes, act mainly upon the muscular coat. Others, as mercury, colchicum, are of value by influencing the excretory function. Some of them, it is probable, also act upon the contents of the bowels and render them more fluid. The knowledge of these special operations of purgatives has led to the advantageous practice of giving them in combination. The value of this is daily proved: for it continually

happens that after the bowels have been kept loose by salines, the administration of some purgative that acts upon the muscular coat is followed by a large comparatively solid evacuation, which shows that accumulation had remained untouched. This is only one instance of what may occur under a variety of circumstances dependent upon the properties of the purgatives employed.

The energetic action of purgatives promotes a large exudation of fluid and a greatly increased exfoliation of epithelium from the surface of the bowels, which in consequence becomes, as it were, abraded, and excited to renew again and again a crowd of living atoms that, as soon as they are formed, are in their turn cast off and swept away. All this is accomplished at a large expense of vital power, and is of course attended by depression of the general system. Moreover, the demand made upon the vascular and nervous systems, in order that these evacuations may occur, is such as to become of much importance in reference to these systems, inasmuch as the great supply of blood sent to the intestinal canal and the peculiar arrangement of the abdominal circulation together cause remarkable effects to follow the free exudation and exfoliation from the mucous surface; effects which influence the general system, but the great abdominal organs in particular, and

especially the liver. For as the blood conveyed to the intestines is gathered up by the portal vein and carried to the liver, it follows that a large secretion from the mucous membrane of the bowels must much lessen the supply of blood to the liver, and thus tend to the depletion of that organ. Indeed, such large secretion induces a result as complete and effectual as bloodletting itself can produce, and in certain states of the liver may altogether supersede that powerful agent, or render its repeated use unnecessary. The conditions of liver which require this diminution of supply through the porta vary very much. The organ may be suffering from active or passive congestion, or be undergoing the changes which lead to cirrhosis. In consequence of the activity of the absorbing surface of the bowels, or from high living, the porta itself may become so congested, and its contents so rich, as to hurry the liver into increased action, ending in hypertrophy; or there may be some obstruction in the heart, the effects of which quickly make themselves felt by the liver, and consequently by the portal circulation. Under all these conditions, the steady and persevering use of purgatives—especially of those which produce large watery evacuations—will be followed by decided benefit.

But the effect of purgatives freely used is felt beyond the porta, or the rest of the sanguiferous

system. The very depressing influence which acute diseases of the abdominal viscera have over the entire frame (as seen to a remarkable degree in ileus, in which usually a very small portion of gut is affected, but in which the symptoms are most alarming and the disease rapidly fatal); the very exhausting effect of long continued or violent purgation, which, though in part accounted for by the loss of fluid, cannot be entirely so explained: these show how deeply the nervous system is involved when the abdominal viscera are actively attacked. Indeed, on surveying the diseases of the abdomen, we cannot fail to notice the important part which the nervous system plays on all occasions. Whether we have excitement from irritation, or depression from absolute disease, it springs from the common cause which gives a characteristic impress to all the diseases and disorders of the abdomen, and that cause is the dominant influence of the nervous system. The demand upon the nervous energy of the bowels consequent on the free operation of purgatives is followed by exhaustion of the ganglionic system, and, through that, of the whole nervous system. Further, it is probable that this state of the ganglionic system induces a diminished tonicity of the great vessels of the abdomen, so that a tendency to syncope ensues.

Thus we see, that by the indirect action of pur-

gatives upon the vascular and nervous systems we are able to bring about rapidly produced and quickly felt effects, which are justly regarded as valuable aids when our object is to lower the tone of the general system.

But although the effects of purgatives are often valuable aids towards the cure of disease, and may with propriety be induced to a great extent, yet perhaps there is no complication so troublesome and dangerous as diarrhœa, especially at the latter part of a disease.

Like as purgatives induce a common result in different ways, so do our means of controlling the too hasty and abnormal action of the bowels accomplish our purpose in various manners; one effect, however, though differing in degree, being common to all: namely lessened secretion from the bowels. Some of these remedies act solely upon the mucous surface and diminish its secretion: as catechu, kino. Some act chiefly upon the muscular coat and lessen the peristaltic action: as lead. Others, by mixing with the contents of the bowels render them more solid, and also, through some chemical agency, neutralise their irritating properties: as chalk.

In most cases of diarrhœa the discharge mainly consists of an increased quantity of the fluid which naturally lubricates the intestinal surface and must

be considered as an exhalation or secretion, rather than as an excretion. Like as the ordinary flow of the secretion is excited by wholesome food, so the increased discharge which constitutes diarrhœa is generally caused by the presence of irritating matter. Sudden change of temperature is also a common cause. When irritating matter causes diarrhœa, it should of course be removed; but we must not assume that, because it originated the disorder, it still continues in operation: for in by far the majority of cases the first few dejections carry away the exciting cause, and consequently leave nothing but its effects. If under such circumstances purgatives be given, unhealthy secretions will quickly be produced, danger of goading the glandular structure of the bowels into disordered or even diseased action be incurred, and simple diarrhœa be converted into an obstinate disease.

Therefore, astringents should be given very early. Indeed, considerable experience has taught me that diarrhœa is best treated by being checked at once: for, as before said, the injurious matter is soon expelled—usually before the case falls under the practitioner's notice,—but its expulsion is seldom followed by diminished discharge. If after the purging is checked the evacuations are unhealthy—contain the products of disordered secretion or excretion, and the

remains of undigested food,—a mercurial should be given a few times, followed by a mild laxative; as castor oil. But in the great majority of cases the evacuations resume the healthy appearance immediately after the judicious use of astringents has been commenced.

A highly important action of medicines upon the intestinal surface remains to be noticed, as affecting its excretory function. By this term it is not meant to express the process previously spoken of, which eliminates from the villous surface a fluid largely composed of water containing the remains of epithelium, &c., and which almost any irritating cause may excite unto unusual activity; but the excretory function of the glands which thickly stud the surface of the bowels, and especially that of the large intestine. The great number of these would alone lead us to infer the importance of their office. Although the lungs, liver, kidneys, and skin, contribute largely to the depuration of the body, there is little doubt that these glands contribute greatly to the same result, though probably by expelling matter different from that which those other depurating organs eliminate. That these glands have such an office is confirmed by the fact that they frequently become disordered and diseased in those general maladies which arise from the circulation of a morbid poison. As has been noticed

elsewhere in these pages, in many diseases which seem to arise from such a cause, as fever, the exanthemata, erysipelas, rheumatism, the intestinal surface appears to be the channel through which the poison leaves the system: for in the course of these diseases, especially towards their end, the excretion from the bowels is of a very unhealthy character. To such a degree is the tendency to affection of these glands in fever, that under certain circumstances they become extensively diseased; and the almost invariable existence of disease of these glands in particular epidemics it was that gave rise to the notion—now getting obsolete—that the essence of fever lay in this lesion. Yet, while this notion is known to be ill-founded, there can be no question—as has been admitted in all ages—that the bowels are peculiarly liable to become diseased in the course of fever. Moreover, experiments upon the lower animals have clearly shown that when decomposed animal matter (in other words, a kind of morbid poison) is injected into the veins, fetid discharge from the bowels quickly follows, and that if the discharge is abundant, recovery often ensues. Again, in rapid emaciation, from whatever cause, the motions become very unhealthy.

Hence it would seem that at least some morbid poisons are cast out from the system through the

bowels, and the obvious inference is, that when the body is suffering from the presence of a morbid poison our efforts should be directed to a judicious encouragement of the natural tendency to expel the pernicious agent. This is not to be done by mere purging. It is not a quantity of discharge, but a discharge of a peculiar kind, that we want. Ordinary purgatives simply clear out the primæ viæ. When they have done that, their office is at an end. In the cases we are now speaking of I have known such purgatives to be given until the patient was greatly distressed and the evacuation apparently healthy, but the disease in no way relieved; when by changing to a purgative known to act upon the proper excretory apparatus—as mercury or colchicum—an abundant discharge of a most unhealthy character has been produced, and, by repetition of the remedy, has for a time been made to flow, to the evident advantage of the patient.

In fact, regarded in all its relations, the excretion from the bowels is quite as worthy an object of attentive examination and study to the physician as excretion from the kidneys, and is, besides, much more immediately under his control.

As mentioned in the remarks on mercury and colchicum, there are many affections—as rheumatism, gout, and anomalous disorders of the general health

accompanied by pains in the limbs—in which the intestinal evacuations often are unhealthy, unusually fetid and dark, though accumulation has not occurred; their character, however, varying much, being on one day very morbid, on another, apparently healthy; the urine in such cases being turbid. This state of things is commonly found in persons who cannot be said to be suffering under any disturbance of the digestive function or to be labouring under affection of any organ, so as to enable us to point out the origin of the mischief; but in whom the system appears to be deranged and the blood impure, and over whom an attack of rheumatism, gout, gravel, or other disease, seems to be impending. If under these circumstances remedies that act upon the excretory apparatus of the bowels are given, a very large quantity of disordered matter flows, and great relief immediately ensues; the urine becoming clear before the character of the evacuations from the bowels improves.

In no instance is the coincidence of removal of morbid matter excreted and relief of disease better marked than in rheumatism. In by far the larger number of cases of that disease appropriate purgatives are followed by very dark, unhealthy, and offensive evacuations, which frequently continue to flow for several days; the patient experiencing little relief

until the evacuations begin to improve; until, in fact, the morbid matter has been in great part expelled from the system. Then the relief is rapid and surprising. But it is necessary to persist in the treatment until the evacuations become and continue healthy; for though relief is coincident with their improvement and cessation of the disease is synchronous with their return to the normal condition, yet the patient is not safe until the healthiness of the evacuations has been steadily established. These observations apply to rheumatism in all its forms. In the acute, if there is no internal local affection—pericarditis, for example—a sudden and large discharge of the morbid matter mentioned frequently sweeps away the disease. In the chronic forms, however, the purgative must be steadily continued and the unhealthy discharge be produced for a longer time than in the acute cases; occasionally, indeed, for so long a time that the practitioner must have some confidence as to the result to enable him to persevere in a treatment so much less immediately beneficial than in the acute form, though quite as necessary to the cure.

Yet purgatives, used as suggested, are by no means always sufficient to cure rheumatism. Though it is, in all cases, of prime importance to procure these evacuations, the disease does not necessarily end when the materies morbi is expelled: for the materies

morbi is apt to originate and leave behind local actions and disorders that require appropriate remedies. The sound mode of treating rheumatism in its chronic form is in all cases to bring into activity the excretory function of the bowels, and then to treat the prominent disorders as they appear; pain, by remedies appropriate to the nervous system; fibrous affection, by iodine: being particularly careful to distinguish between the form of the disease which is aggravated by heat and the form which is relieved by heat.

Moreover, we should never forget, that in very many cases disordered digestion is, to say the least, intimately connected with the disease: as is seen in the constant recurrence of pains in the joints, &c., immediately after a very full or rich meal, or any great error in diet. Remedies directed to the disordered digestion commonly render the rheumatic attacks less frequent, and if the healthy condition of the chylo-poietic viscera can be re-established, the liability to the rheumatism is much diminished, especially when a gouty tendency is also present. In such cases it is that the Spas are of service.

We see, then, that the effect of remedies upon the excretory function of the bowels is felt far beyond the bowels themselves; that the continued discharge of morbid matter from the bowels is not to be regarded as a sign of obstinately disordered action, but

as the evidence of a salutary effort which should be promoted, not checked; and that the ameliorated condition of the discharge is to be regarded as an indication or effect of improvement in the system, rather than as a cause of such improvement. Yet the mere occurrence of morbid evacuations similar to those in question does not justify the persevering use of purgatives, in the hope of bringing about the elimination of morbid matter, unless there is some proof that a morbid poison is lurking in the system; unless, in a word, there is evidence irrespective of, and unconnected with, the bowels—as offered by rheumatism, eruptive fevers, &c.—to lead us to such a conclusion. For in certain conditions of the bowels active and long continued purgation alone will produce unhealthy evacuations. Under such circumstances, it is probable that the glandular apparatus of the bowels is irritated into a perverted action, and in consequence excretes a morbid matter closely resembling that of which we have been speaking. It is highly probable that every excretory organ is susceptible of, nay prone to, a disordered action by which the elements subjected to it, instead of being converted into a normal excretion, are perverted into a diseased product, analogous, however, to that which ought to be excreted.

Therefore, in the case of the bowels we must be on our guard lest we convert an important eliminating

organ into a centre of diseased action: for however little the remark may apply to the well-informed, we know from actual observation that the practice of "bringing away the secretions" is far too generally adopted.

In closing my remarks on this important system I may observe, that, as it receives the supply for the body, the manner in which it elaborates the materials that ultimately enter into the general system will greatly affect the blood and the secretions derived from it, especially the urine, upon which, in particular, errors of diet quickly act. Nothing is more common than turbid urine after a full meal of rich and varied food, especially if the body was somewhat exhausted before the repast, or the individual is of feeble constitution.

Now, if this secretion is so liable to be altered by an error or disturbance in the very first stage of assimilation, how can its appearance be a safe guide as to the nature, or the proper treatment, of disorders seated in different parts or organs, and dependent on imperfect assimilation by other structures? In short, how can the state of the urine be relied on as a sure indicator of the condition of the secondary assimilation, if it can be so disturbed by the primary, unless, indeed, the matters found in the urine be very dissimilar in the two cases? It is not denied that the venous sys-

tem contains compounds formed by the secondary assimilation, which, being excrementitious, are conveyed to the kidneys in order to be cast from the body, and that the presence of these compounds in the urine may give rise to many alterations in its composition. But is there any product solely and exclusively derived from this source, in health or in disease? Is it certain that the changes of matter in the general system, living or dead, do not assume every variety of elemental combination which the urine presents? If there is a probability, or even a possibility, of such being the fact, then so great a doubt is thrown over the whole question as to the state of the urine being an index to the nature of the disease, that the signs derived from the condition of that fluid are, for practical purposes, useless.

Now, when we consider that the intestinal canal receives all kinds of organic compounds; that these are in every variety of state which can lead them to assume new combinations; that the very process of assimilation for which they are ultimately destined is of a vital nature (and who shall say how much the first and second digestions differ in their vital nature, if differ they do at all?); that the products of primary assimilation, when once carried into the blood, reach the kidneys in common with those derived from the secondary digestion: when we consider all this, we

see how extremely difficult—not to say impossible—it is in the present state of science to distinguish in the urine between the results of faulty digestion in the first passages; the products of the general system, whether from the secondary digestion or not; and the matters derived from the kidneys themselves. And yet, until such a distinction can be clearly made, the urine will be of very small value as an evidence in disease. It will show that something is somewhere wrong; but the question as to whether its disordered condition arises from transient disturbance or from deeply seated disease will not be determined until we know that such and such products are derived from such and such sources, and from no others. So long as the alimentary canal may be regarded as a probable source of all, our reasoning upon the subject must be speculative in the extreme.

SUPPORT.

In the preceding pages remarks have been often made on the employment of support. Indeed the subject so frequently and prominently presents itself to the practitioner, that he can scarcely proceed a step without giving it some consideration. Support, how-

ever, opens a question far too extensive to be treated of at length in this place, and I shall merely make a few general and leading observations upon it, premising that the more deeply the physician is impressed with its importance and the more ably he imparts its benefits, the sounder, safer, and more successful, will be his practice.

As with medicines, the effects of support depend much on the state of the system. A very moderate portion — a quantity much less than that taken in health — will in some disordered states of the system greatly aggravate the symptoms, and produce much general distress and feverishness; whereas under other circumstances the violence of the symptoms will abate, the febrile excitement diminish, and the vital powers become evidently strengthened. So that, at the discretion of the practitioner, support is an important agent of good or of evil. Looking at it in its negative aspect only, that is, in reference to withholding it in part or altogether, we shall find it to be a powerful auxiliary in the treatment of disease: for, by withdrawing wholly, or by diminishing in quantity, the very source of supply to the ever-wasting body, great effect is produced in health, and still greater in disease: because in disease assimilation is weakened or pauses, and no products are formed or unhealthy matters are produced and circulated in the system;

or, if assimilation is still active, its very effort greatly excites the already feverish body and forms matter upon which the disease preys. Our present purpose, however, is not to speak of when support should be withheld, but of when it should be given.

In these remarks the term support is understood to include two means of sustaining the vital powers: namely, stimulants and food. Stimulants comprise spirits, wine, and malt liquors: food is, of course, made up of a variety of diet. These two means, though conducing to the same end, effect their purpose in different ways. Stimulants appear to act chiefly by exciting renewed tone and force in the vascular and nervous systems, and by consequently rousing the formative tissue to increased vigour; a portion of the excitant being no doubt carried by the circulation to that tissue, in order to produce on it a direct stimulating effect; which effect, however, is perhaps the least valuable part of the remedial action of the agent. Food appears to be chiefly operative by supplying the requirements of the formative tissue. Stimulants beyond question add something to the general nourishment of the body, but that is an unimportant part of their use. Food slightly stimulates, but stimulation is the smallest and least valuable of its effects. Stimulants excite the vital powers to a degree that necessarily leads to exhaustion, unless the means of recruit-

ing are at hand. Food excites but little, and affords the only means by which exhaustion can be repaired and depressed vigour be permanently re-established. Hence, generally speaking, the necessity for the conjoint employment of these two elements of support. For though the property possessed by stimulants of exciting the vital powers causes only an apparent strength, which must not be trusted, it is nevertheless highly valuable, and is continually employed in the treatment of disease, whether we wish to rouse to activity the languishing vigour of the system, and thus give freshness and energy to the vital operations in general, or to rally the fast sinking powers, in order that the weakened body may be urged into an artificial strength until it can be fortified by food.

By support, then, we can obviate the tendency to sinking; sustain the body, and enable it to withstand the inroads of, and repair the damage from, disease; and uphold it while subjected to the effects of necessary remedies.

To prevent or resist the tendency to sinking should be our constant care. This state is brought about by various circumstances, and generally by structural changes, which, though slight at the commencement, become more and more serious as the disease advances; but which are, nevertheless, of inferior moment in presence of the imminent fatal ter-

mination and its more immediate cause: and therefore, notwithstanding that recovery is ultimately impossible unless these changes are stayed, and perhaps removed, yet as the tenure of life is peculiarly in peril, our great object must be to maintain it, while we temporarily disregard the less urgent dangers of the patient. In fatal disease it frequently happens that the organic change is insufficient to account for death, and, on the contrary, we often see life continue when very considerable structural alteration exists. Indeed, seeing the surprising recoveries that not unfrequently occur, the physician should never entirely lose hope, or relax in his endeavours—except in cases which are known to be necessarily fatal,—until his patient is actually dying. Yet he should not feel confident of recovery because the disease yields to his remedies, unless the amendment is accompanied by manifest improvement in the general condition of the system.

Although the labours of physiologists have cleared away much of the obscurity which once shrouded the subject of death, and have shown that the occurrence of certain corporeal changes and the failure of certain functions are quite incompatible with the continuance of life, yet, watched at the bed-side, the progress towards dissolution is rarely so simple as they have taught. Still, the practitioner may with advantage keep their teaching in mind and, by appropriate mea-

sures directed to the part which appears to suffer, seek to obviate the fatal tendency. Apart from this evident duty, his practice is reduced to the narrow limits of administering to and sustaining the failing nervous and vascular systems, and of thus invigorating the body in general: for as it is of great importance to lessen the injecting force of the heart and the tonicity of the vessels, when they are in excess; so is it essential to increase them, when they languish and are fast becoming inadequate to the carrying on of life: and as it is important to repress and calm an excited and irritable nervous system, so is it essential to stimulate and invigorate it when it is in a feeble and failing condition.

Under such critical circumstances, it is extremely difficult, if not impossible, to lay down precise rules as to what signs specially indicate the employment of support. Its propriety and extent can properly be determined by experience alone. The laying down of rules has given rise to the great difference of opinion which exists on this subject. For example: "a dry and baked tongue," or a hot and parched skin, or a rapid pulse, or quick respiration, is said to forbid support. Now, without doubt these conditions should influence our judgment, and if any one of them exists when support is administered and becomes aggravated under its employment, we should be cautious. Yet

the presence of these conditions, severally or together, by no means necessarily prohibits support. In very many cases in which support disagrees, the probability is that it does so because it is given too late. The time has passed when it would have been of use, and, instead of aiding the failing powers, it creates an erythism. Yet when there is much muscular debility in the course of acute disease—as shown by tremors, trembling tongue, &c., accompanied by a weak, faltering, throbbing, irregular, pulse,—support is invariably required. But on all occasions its effects must be carefully watched: for though, when properly employed, it is capable of doing great good, it may, when unseasonably given, be followed by great evil.

Support is more frequently necessary in fever than in any other disease. Indeed, it may be said of the fever of our day, that the two great indications of treatment are, to subdue local disease and to keep the patient from sinking. But the conditions that require support may arise in any acute disease, and in any part of its course. Acute inflammation offers a frequent illustration. In it usually the power of endurance is at first augmented. The local disease appears to give a stimulus which enables the system to withstand agents and shocks that in health would be perilous. After a while, however, this stimulus begins to fail and the powers of life to flag; and

although this state is not marked by the same degree of muscular debility as occurs in fever, still the vascular system falls into much the same condition as in that disease. The general powers are often almost fatally depressed by the combined effects of the disease and the remedies: for it is frequently necessary to proceed to great extremes in our treatment in order to prevent the local disease from running on to irreparable and fatal disorganisation, or to such a degree of intensity that the stimulus of its action becomes so great as to consume, as it were, the general vital force. But, to return: the stimulus of the local disease still exists, lessened but not exhausted, and confers upon the system its equivocal benefit. The disease may now take a turn and slowly cease, the system steadily increase in vital power, a just balance be gradually arrived at, and recovery be perfected. But, as frequently happens, the local disease may suddenly give way at the moment in which the remedies have been pushed to the full and the morbid action has reached its height. The system, which had held out so long against both disease and remedies, then unexpectedly and violently feels their effects, and in very many cases falls into a more or less rapidly sinking state. The protective power of the local excitation and exaltation of vital action — which had been felt over the whole body, and at once

called for and enabled it to sustain great losses, shocks, and perturbations, from bloodletting, medicines, &c.—is altogether withdrawn, and the system is suddenly left in a condition far below any that we could venture to induce. The degree of this sinking is often so great that the patient rapidly dies, or falls into a moribund condition which, unless active preventives are employed, soon ends in death. Therefore we must always bear in mind, that if our remedies have been powerful and the disease has suddenly given way, the patient is not necessarily safe, and that we may have to adopt an entire reversal of our treatment. But the tendency to sinking may arise from another cause. The part diseased is frequently unable to recover itself, and though the changes produced by active inflammation no longer occur in it, others of an equally dangerous nature supervene, which, instead of acting as a stimulus, produce much depression of the system. Such a state of things is often misunderstood, the sinking state of the patient being attributed to fresh and aggravated progress of the disease, and remedies being prescribed accordingly; whereas the disease is already checked, and the patient is suffering from its consequences.

Now, under all these circumstances of depression, our object must be to sustain the failing powers of life. We must not be content with merely checking

the imminent sinking, but must endeavour so to restore the system that it may have power to throw off the disease and give a normal action to the suffering part. To stay the disposition to active morbid change is not enough. A healthy tone must be given to the organic energy of the part, lest from its low condition changes—partly perverted vital, partly chemical—should occur, causing great local disorganisation and most pernicious effects upon the rest of the system.

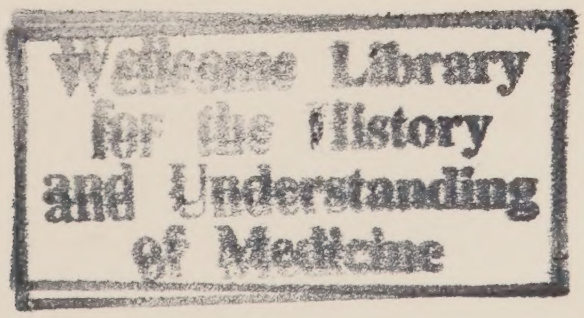
In these cases of tendency to sinking, large quantities of stimulants are required and borne: but if we carefully watch and are prepared for what is likely to happen, we shall have less need of stimulants, and may in part supply their place with food. When, however, stimulants are freely given in cases attended by great debility, it sometimes happens that much reaction occurs, followed by excitement and prostration—the heart beating inordinately, but the nervous system and the formative tissue fast failing in energy. Still the stimulants must not be discontinued, though the chances of recovery are slight; for, notwithstanding the objections which may be urged against them under such circumstances, they are the only means by which we can hope to rally the vital powers. For my own part, I have so often seen patients saved in peril of this kind by the continued and liberal use

of stimulants after the time for employing them seemed past, and after every chance of recovery appeared gone, that I have the greatest confidence in their efficacy. But, if we would derive full advantage from them, they must be freely given, and must, as soon as possible, be seconded by food. When the debility is extreme, especially in the old, malt liquors of the finest class are sometimes of very great service. They seem not only to stimulate and greatly nourish, but to act upon the nervous system and bring the calm and refreshing sleep so difficult to obtain for these persons by narcotics.

But in the treatment of inflammation and of every other disease, even when no danger from sinking is apprehended, the question whether support should be given or withheld must, from its importance, be frequently considered. We have not simply to determine whether the powers of life are so high that energetic means are necessary to repress them, lest they should run into fatal excess; or whether they are so low as to need vigorous support to sustain them; but every gradation between these extremes must be regarded: for the high excitement on the one hand and the feeble sinking on the other merely represent two extreme states, the modifications of which may exist in any degree, and may in the same case variously replace one another. Indeed, support

is of vast moment in the treatment of disease, acute or chronic, and must be carefully considered in every example and under every variety of circumstance. The well-timed use of it will in very many cases decide the patient's fate. Moreover, distressing symptoms will frequently give way to it when other measures fail. For example: wine will often stop vomiting and purging in fever, and suppress the delirium which frequently occurs in that disease.

Lastly, support will enable the body to endure remedies necessary for the subjection of diseased operations going on, but which the debilitated state of the system forbids. On this part of the subject, however, enough has already been incidentally said elsewhere to render more than an allusion to it here superfluous.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